SEWAGE OF TOWNS.

THIRD REPORT

AND APPENDICES

OF

THE COMMISSION

APPOINTED

TO INQUIRE INTO THE BEST MODE

OF

DISTRIBUTING THE SEWAGE OF TOWNS,

AND

APPLYING IT TO BENEFICIAL AND PROFITABLE USES.

Presented to both Houses of Parliament by Command of Her Majesty.

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THIRD REPORT OF THE COMMISSION.

To the Lords Commissioners of Her Majesty's Treasury.

May it please your Lordships,

We, the undersigned, whom Her Majesty's Commission, bearing date 5th January 1857, appointed to "inquire into the "best mode of distributing the Sewage of Towns, and applying "it to beneficial and profitable uses," have now again, according to our instructions, the honour of reporting to your Lordships our further progress in the matter committed to us for inquiry.

Since the date of our last Report (August 1861) we have, through a committee of our number, consisting of Mr. Lawes and Professor Way, continued at Rugby the experiments which were undertaken in 1861 on the application of sewage to land. The report of that committee, which we append, contains the results for the three years 1862–4.

Your Lordships will observe that these experiments have not been confined to the application of sewage in different quantities to land, but have extended to the consumption, by cattle, of the produce so obtained, and to the production of meat and milk, and have been accompanied by a careful record of the quantities and market-value of the products, and by numerous analyses of the sewage before and after irrigation, as also of the grass and of the milk.

It appears to us that these experiments have solved many of the difficulties which have hitherto attached to the question of the agricultural application of sewage, and that they leave no reasonable doubt of the practicability and advantage of so employing the sewage of towns.

We have also continued to give our best attention to all kindred experiments and inquiries which have been going on elsewhere.

As the results of our labours, extending over eight years, we have confidence in submitting to your Lordships the following conclusions:—

1. The right way to dispose of town sewage is to apply it continuously to land, and it is only by such application that the pollution of rivers can be avoided.
2. The financial results of a continuous application of sewage to land differ under different local circumstances; first, because in some places irrigation can be effected by gravity, while in other places more or less pumping must be employed; secondly, because heavy soils (which in

given localities may alone be available for the purpose) are less fit than light soils for continuous irrigation by sewage.

3. Where local circumstances are favourable, and undue expenditure is avoided, towns may derive profit, more or less considerable, from applying their sewage in agriculture. Under opposite circumstances, there may not be a balance of profit; but even in such cases a rate in aid, required to cover any loss, needs not be of large amount.

Finally, on the basis of the above conclusions, we further beg leave to express to your Lordships that, in our judgment, the following two principles are established for legislative application:—

First, that, wherever rivers are polluted by a discharge of town sewage into them, the towns may reasonably be required to desist from causing that public nuisance:

Second, that where town-populations are injured or endangered in health by a retention of cesspool-matter among them, the towns may reasonably be required to provide a system of sewers for its removal.

And should the law, as it stands, be found insufficient to enable towns to take land for sewage-application, it would, in our opinion, be expedient that the legislature should give them powers for that purpose.

(Signed) ESSEX.
ROBERT RAWLINSON.
J. THOMAS WAY.
J. B. LAWES.
JOHN SIMON.

8, Richmond Terrace, Whitehall.
March 1865.

Second Report of Experiments on the Application of Town Sewage to Grass Land, conducted at Rugby, by Order of the Royal Sewage Commission.

Seasons 1861, 1862, and 1863.

In the Second Report of the Commission, presented to both Houses of Parliament in 1862, an account was given of the results obtained in the First Season (1861) of Experiments on the application of town sewage to grass land, which were undertaken by order of the Royal Sewage Commission, and conducted in the neighbourhood of Rugby, where, arrangements being made for the distribution of the sewage of the town over a considerable area of adjacent land, the conditions were considered well adapted for the purposes of the inquiry.

As stated in the preliminary Report above referred to, the Commission, guided by the information acquired in the course of their investigation of the then existing experience on the subject, which had led them to visit almost every locality where town sewage was applied in any way to the purposes of agriculture, had come to the conclusion that to obtain the largest amount and value of produce at the least proportionate cost for distribution, dilute town sewage should be applied to the growth of succulent crops, and that it was best adapted for grass. It was decided, therefore, to confine attention, at any rate in the first instance, to grass alone.

In arranging the experiments, it was considered that the object was to provide such information as might be taken as the basis of arrangements for the application of the sewage of towns, in the manner the most advantageous to both urban and rural interests.

To this end it was sought to determine:—

1. The amount and the composition of the produce, in relation— to the amount of water supplied to the land by irrigation, to the amount of manurial constituents so applied, and to the amount of population contributing the manurial constituents to the water.
2. The most profitable method of utilising the produce; that is, whether it should be used in the green state or as hay; whether for the production of milk or of meat; and whether it should be consumed alone or in conjunction with other food.

In the experiments of the first year, three portions of land, of about five acres each, were operated upon, and each of these was divided into four plots, to be treated, respectively, as follows:

Plot 1. To be unsewaged.

Plot 2. To be irrigated with sewage at the rate of 3,000 tons per acre per annum.

Plot 3. To be sewaged at the rate of 6,000 tons per acre per annum.

Plot 4. To be sewaged at the rate of 9,000 tons per acre per annum.

The produce of one such set of four plots was to be given, in the green state, to fattening oxen; that of the second (also in the green state) to milking cows; and that of the third was to be made into hay.

As explained in the former Report, owing to deficient supply, but little sewage was applied to the portion of land devoted to the production of hay; and, since the first season, the five acres in question have each year been sublet.

The results obtained in the first year's experiments on the other portions of land were given in detail in the previous Report; but it was admitted that the experience of one year only could be taken as little more than initiative on many points; it being obviously essential to determine the effects of the continued application, and the influence of seasons of different characters, before safe deductions could be drawn in regard to some of the most important economical questions at issue.

The results of two more seasons (1862 and 1863) are now at command; and it is proposed to call attention chiefly to the difference of result obtained in the different seasons, and to the average result over the three seasons, making but few comments on those of each separate season. The full details will, however, be given for reference, in the tabular form, in Appendix, No. 1., p. 81, et seq.

In addition to the experiments above referred to, which are a continuation of those already reported, by the kindness of Mr. Campbell some results obtained on the application of sewage to Italian rye-grass and to oats are also given.

For the convenience of reference and comparison, the numerical results will, as far as possible, be arranged in the same form, and the subject considered in the same order, as in the former Report.

I. *Quantities of Sewage applied, and of Green Produce obtained.*

In the first season (1861) the application of sewage did not commence until March in the one field, and April in the other; but, as it was considered that any scheme for the general application of town sewage to agricultural purposes must of necessity be based on the fact of a daily supply the year round, which

must be dealt with in winter when of comparatively little value as well as in summer when of more, the amounts of 3,000, 6,000, and 9,000 tons, respectively, were, in the second and third seasons, distributed over the entire year, and the quantities supplied from November 1st of one year to October 31st of the next were taken as those to which the increase of crop was due.

The detailed records relating to the application of the sewage are given for reference in Tables I. and II. pp. 81–89. Appendix, No. 1. Of these, Table I., which now follows, is a convenient summary.

Table I.—Quantities of Sewage applied per Acre, on each Plot, in each Month, in each of the Three Seasons.

—	Sewage per Acre.					
	Five-acre Field.			Ten-acre Field (half).		
	Plot 2.	Plot 3.	Plot 4.	Plot 2.	Plot 3.	Plot 4.
1st Season, 1861; March—October, inclusive.						
	Tons.	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*
March - -	632·1	1045·1	1444·2	..	..	..
April - - -	279·9	666·4	1177·0	563·0	1145·9	1376·9
May - -	75·8	96·5	97·7	18·3	64·1	118·8
June - - -	78·8	223·3	577·2	..	..	392·3
July - -	531·7	430·2	654·1	512·0	392·2	905·7
August - -	130·6	580·2	787·3	225·9	316·3	595·1
September -	143·1	703·3	614·7	34·0	517·7	381·8
October - -	201·7	678·2	800·7	34·0	367·7	455·8
Totals - -	2073·7	4423·2	6152·9	1387·2	2803·9	4226·4
Rate per annum -	3110·4	6634·8	9229·1	2378·1	4806·7	7245·4
2d Season, 1862; November 1861—October 1862, inclusive.						
November 1861 -	313·1	499·8	745·0	116·3	341·5	451·4
December „ -	126·6	429·8	527·6	71·5	143·5	277·3
January 1862 -	323·0	457·6	583·3	77·4	159·2	235·7
February „ -	169·2	575·0	751·6	227·5	187·2	330·1
March „ -	235·4	455·8	478·2	109·9	374·0	524·7
April „ -	211·8	503·0	720·1	508·5	903·5	876·3
May „ -	281·8	581·4	763·0	289·6	425·1	1201·5
June „ -	77·1	164·7	292·7	173·0	327·0	410·0
July „ -	580·1	840·4	1323·7	595·5	1255·9	2017·0
August „ -	309·1	476·9	1412·0	397·5	1000·8	1385·6
September „ -	79·4	623·6	628·6	177·6	306·3	776·9
October „ -	285·2	386·5	730·9	255·2	485·5	517·8
Totals -	2991·8	5994·5	8986·7	2999·5	5999·5	9004·3

TABLE I.—*continued.*

Quantities of Sewage applied per Acre, on each Plot, in each Month, in each of the Three Seasons.

—	SEWAGE PER ACRE.					
	FIVE-ACRE FIELD.			TEN-ACRE FIELD (half).		
	Plot 2.	Plot 3.	Plot 4.	Plot 2.	Plot 3.	Plot 4.
3d SEASON, 1863; November 1862—October 1863, inclusive.						
November 1862 -	201·9	513·0	806·8	288·2	597·6	771·3
December „ -	114·2	315·2	500·1	151·6	625·5	894·6
January 1863 -	351·2	489·3	580·2	493·6	436·0	849·3
February „ -	194·6	550·6	655·4	200·9	550·9	1013·6
March „ -	482·7	774·4	1375·8	203·9	390·8	397·0
April „ -	234·2	550·9	640·5	203·9	395·8	592·5
May „ -	90·4	579·3	555·3	39·8	582·9	742·3
June „ -	896·6	540·9	462·5	385·4	974·8	949·1
July „ -	100·9	426·4	980·6	492·4	344·8	779·6
August „ -	..	409·5	964·2	150·0	..	717·0
September „ -	275·1	617·3	660·3	..	640·9	495·1
October „ -	57·1	232·8	819·0	391·3	459·8	797·1
Totals -	2998·9	5999·6	9000·7	3001·0	5999·8	8998·5
SUMMARY. 1861, 1862, and 1863.						
1st Season; to Oct. 31, 1861 -	2073·7	4423·2	6152·9	1387·2	2803·9	4226·4
2d Season; to Oct. 31, 1862 -	2991·8	5994·5	8986·7	2999·5	5999·5	9004·3
3d Season; to Oct. 31, 1863 -	2998·9	5999·6	9000·7	3001·0	5999·8	8998·5
Totals -	8064·4	16417·3	24140·3	7387·7	14803·2	22229·2

It is seen that when calculated over the entire season the supply of sewage was in each case very nearly at the rate intended, but that it varied considerably from month to month. Regularity in this respect was, indeed, sought to be attained within certain limits, but it was necessarily subject to various controlling circumstances. Thus, the sewage was, as a rule, applied on the same plot for an entire day at a time, in order the better to secure its even distribution over the whole, and the rate of flow, and consequently the day's supply, varied considerably. Then, again, throughout the summer months the stage of growth of the crop much influenced the time of application, which was regulated so as to ensure, as far as possible, the beneficial action of the total quantity applied in each case. Occasionally, too, the supply was entirely stopped, owing to derangements in the machinery, a matter over which there was unfortunately no control.

The amounts of green grass obtained from the respective plots, in each of the three seasons, are shown in Tables II. and III. (pp. 9 and 10); Table II. giving the amounts obtained in each separate month, and Table III. those in each successive crop. For further details, *see* Appendix Tables, III. and IV., pp. 90–96.

Table II.—Amount of Green Grass obtained during each separate Month.

Green Grass per Acre.

Five-acre Field.

—	Without Sewage. Plot 1.				With Sewage. Plot 2.				With Sewage. Plot 3.				With Sewage. Plot 4.			
	tons.	*cwts.*	*qrs.*	*lbs.*	*tons.*	*cwts.*	*qrs.*	*lbs.*	*tons.*	*cwts.*	*qrs.*	*lbs.*	*tons.*	*cwts.*	*qrs.*	*lbs.*
First Season, 1861.																
May	–	–	–	–	–	–	–	–	–	–	–	–	1	9	3	14
June	3	2	3	27	4	17	0	14	7	19	1	23	8	14	3	8
July	3	1	0	8	2	8	0	15	4	6	0	26	6	14	0	13
Aug.	–	–	–	–	3	16	2	23	4	12	2	8	5	19	2	24
Sept.	2	2	2	8	1	3	0	12	6	5	1	7	5	0	0	5
Oct.	0	19	0	18	2	11	3	0	0	8	0	24	0	16	0	23
Nov.	–	–	–	–	–	–	–	–	3	9	1	6	4	2	0	5
Dec.	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Totals	9	5	3	5	14	16	3	8	27	1	0	10	32	16	3	8
Second Season, 1862.																
May	–	–	–	–	0	19	1	19	9	15	3	9	8	7	3	6
June	0	8	1	26	5	10	0	10	5	16	0	26	5	15	1	15
July	3	16	0	23	8	2	3	3	–	–	–	–	4	19	1	19
Aug.	2	8	2	10	4	16	2	16	9	12	0	25	2	0	2	24
Sept.	–	–	–	–	4	0	1	10	6	12	2	10	9	15	0	0
Oct.	1	10	0	7	4	8	3	16	2	13	1	5	1	11	1	14
Nov.	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Totals	8	3	1	10	27	18	0	18	34	10	0	19	32	9	2	22
Third Season, 1863.																
April	–	–	–	–	–	–	–	–	–	–	–	–	3	16	3	12
May	–	–	–	–	4	9	1	25	12	4	3	18	6	0	0	15
June	–	–	–	–	6	4	3	5	3	9	2	20	10	13	2	0
July	3	18	3	14	6	7	3	9	5	17	2	2	–	–	–	–
Aug.	–	–	–	–	–	–	–	–	4	2	3	5	7	15	3	16
Sept.	0	19	3	27	2	7	1	27	6	12	0	23	7	14	0	2
Oct.	–	–	–	–	2	12	1	15	2	5	3	5	0	14	1	20
Nov.	–	–	–	–	0	3	0	16	0	5	2	10	0	5	2	24
Totals	4	18	3	13	22	5	0	11	34	18	1	27	37	0	2	5

Ten-acre Field (half).

—	Without Sewage. Plot 1.				With Sewage. Plot 2.				With Sewage. Plot 3.				With Sewage. Plot 4.			
	tons.	*cwts.*	*qrs.*	*lbs.*	*tons.*	*cwts.*	*qrs.*	*lbs.*	*tons.*	*cwts.*	*qrs.*	*lbs.*	*tons.*	*cwts.*	*qrs.*	*lbs.*
First Season, 1861.																
May	–	–	–	–	0	14	0	20	1	4	0	10	2	5	0	0
June	4	10	1	1	4	11	2	8	5	4	1	7	8	16	1	7
July	0	8	1	18	5	5	1	2	5	8	0	19	1	16	3	24
Aug.	1	6	3	9	0	10	2	26	4	12	1	1	5	4	2	7
Sept.	2	3	2	7	0	11	0	13	1	15	0	3	4	16	2	0
Oct.	0	9	0	8	3	19	1	15	4	0	3	7	3	6	0	2
Nov.	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Dec.	–	–	–	–	0	4	0	2	0	7	3	21	0	8	2	0
Totals	8	18	0	15	15	16	3	2	22	15	2	12	26	13	3	12
Second Season, 1862.																
May	0	17	1	16	1	14	0	5	11	13	2	7	8	14	0	21
June	7	10	2	11	15	0	0	3	2	7	2	20	1	15	1	7
July	2	11	2	0	0	8	2	24	6	9	3	6	8	16	1	2
Aug.	0	11	3	0	6	12	1	3	–	–	–	–	2	15	3	8
Sept.	3	8	0	17	0	16	0	8	9	16	1	22	6	2	2	12
Oct.	–	–	–	–	3	0	0	5	1	14	3	15	3	8	0	26
Nov.	1	10	3	9	–	–	–	–	–	–	–	–	–	–	–	–
Totals	16	10	0	25	27	11	0	20	32	2	1	14	31	12	1	20
Third Season, 1863.																
April	–	–	–	–	–	–	–	–	–	–	–	–	3	14	3	0
May	–	–	–	–	–	–	–	–	9	0	0	21	4	7	2	27
June	3	7	3	25	13	1	3	22	5	16	0	22	11	13	2	21
July	2	19	3	27	5	13	0	6	4	15	0	13	0	9	3	12
Aug.	–	–	–	–	–	–	–	–	5	14	3	0	7	16	2	14
Sept.	1	12	3	23	6	1	0	2	1	5	1	12	0	12	3	0
Oct.	–	–	–	–	–	–	–	–	3	9	3	20	5	12	2	3
Nov.	–	–	–	–	0	9	1	6	0	10	0	5	0	11	2	0
Totals	8	0	3	19	25	5	1	8	30	11	2	12	34	19	1	21

Table III.—Amounts of Green Grass obtained in each successive Crop.

—	Green Grass per Acre.																															
	Five-acre Field.																Ten-acre Field (half).															
	Without Sewage.				With Sewage.												Without Sewage.				With Sewage.											
	Plot 1.				Plot 2.				Plot 3.				Plot 4.				Plot 1.				Plot 2.				Plot 3.				Plot 4.			
	tons.	*cwts.*	*qrs.*	*lbs.*	*tons.*	*cwts.*	*qrs.*	*lbs.*	*tons.*	*cwts.*	*qrs.*	*lbs.*	*tons.*	*cwts.*	*qrs.*	*lbs.*	*tons.*	*cwts.*	*qrs.*	*lbs.*	*tons.*	*cwts.*	*qrs.*	*lbs.*	*tons.*	*cwts.*	*qrs.*	*lbs.*	*tons.*	*cwts.*	*qrs.*	*lbs.*
First Season, 1861.																																
1st Crop -	6	4	0	7	7	5	1	1	10	7	0	24	13	5	1	22	4	18	2	19	9	13	3	12	11	5	3	2	11	1	1	4
2d Crop -	3	1	2	26	4	3	1	25	7	8	1	0	9	15	0	11	3	19	1	24	2	11	0	0	5	18	2	17	7	1	2	6
3d Crop -	–	–	–	–	3	4	0	11	5	16	1	8	5	14	0	26	–	–	–	–	3	2	3	16	5	3	1	0	8	2	2	2
4th Crop -	–	–	–	–	0	3	3	27	3	9	1	6	4	2	0	5	–	–	–	–	0	4	0	2	0	7	3	21	0	8	2	0
Totals	9	5	3	5	14	16	3	8	27	1	0	10	32	16	3	8	8	18	0	15	15	16	3	2	22	15	2	12	26	13	3	12
Second Season, 1862.																																
1st Crop -	6	13	1	3	14	12	1	4	15	12	0	7	14	3	0	21	10	19	1	27	16	14	0	8	14	1	0	27	8	14	0	21
2d Crop -	1	10	0	7	8	16	3	26	9	12	0	25	7	0	0	15	3	19	3	17	7	0	3	27	6	9	3	6	10	11	2	9
3d Crop -	–	–	–	–	3	18	1	9	8	1	0	5	9	15	0	0	1	10	3	9	3	7	3	2	9	16	1	22	8	18	1	20
4th Crop -	–	–	–	–	0	10	2	7	1	4	3	10	1	11	1	14	–	–	–	–	0	8	1	11	1	14	3	15	3	2	0	5
5th Crop -	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0	6	0	21
Totals	8	3	1	10	27	18	0	18	34	10	0	19	32	9	2	22	16	10	0	25	27	11	0	20	32	2	1	14	31	12	1	20
Third Season, 1863.																																
1st Crop -	3	18	3	14	10	14	1	0	12	4	3	18	9	16	3	27	6	7	3	24	13	1	3	22	12	9	0	7	8	2	1	27
2d Crop -	0	19	3	27	6	7	3	9	9	7	0	22	10	13	2	0	1	12	3	23	5	13	0	6	7	2	1	24	11	13	2	21
3d Crop -	–	–	–	–	4	2	3	24	7	2	3	1	6	18	2	5	–	–	–	–	6	1	0	2	7	0	0	12	8	6	1	26
4th Crop -	–	–	–	–	0	16	3	18	5	18	0	4	8	11	1	13	–	–	–	–	0	9	1	6	3	9	3	20	6	5	1	3
5th Crop -	–	–	–	–	0	3	0	16	0	5	2	10	0	14	1	20	–	–	–	–	–	–	–	–	0	10	0	5	0	11	2	0
6th Crop -	–	–	–	–	–	–	–	–	–	–	–	–	0	5	2	24	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Totals	4	18	3	13	22	5	0	11	34	18	1	27	37	0	2	5	8	0	3	19	25	5	1	8	30	11	2	12	34	19	1	21
Summary—1861, 1862, and 1863.																																
1861 -	9	5	3	5	14	16	3	8	27	1	0	10	32	16	3	8	8	18	0	15	15	16	3	2	22	15	2	12	26	13	3	12
1862 -	8	3	1	10	27	13	0	18	34	10	0	19	32	9	2	22	16	10	0	25	27	11	0	20	32	2	1	14	31	12	1	20
1863 -	4	18	3	13	22	5	0	11	34	18	1	27	37	0	2	5	8	0	3	19	25	5	1	8	30	11	2	12	34	19	1	21
Average -	7	9	1	9	21	13	1	12	32	3	1	0	34	2	1	12	11	3	0	10	22	17	3	1	28	9	3	13	31	1	3	18

Table II. shows that the crops obtained before the end of May were very much larger in the second and third seasons than in the first season, in which case no sewage had been applied during the winter months. The much greater luxuriance of growth in the early season was, indeed, remarkable after the winter applications; and the crops were invariably in the most forward condition where the largest quantities of sewage had been applied. There is, of course, a great advantage in getting an early cut of green food, and a given weight will be worth more quite early in the season than some weeks later. Still, it is not to be supposed that the same amount of increase of produce will be obtained for a given amount of sewage applied during winter, as during the periods of active growth.

It is also to be observed that the crops obtained late in the season, in September and afterwards for example, were always considerably heavier with sewage than without it, heavier with 6,000 tons than with 3,000, and generally heavier with 9,000 than with 6,000.

Thus, not only was the total amount of produce obtainable per acre very much increased by the application of sewage, but the period during which an abundance of green food was available was extended considerably, both at the beginning and the end of the season, and it was the more so the larger the quantity of sewage applied, almost up to the highest amount adopted in the experiments, namely, 9,000 tons per acre.

Table III. shows that in only one instance, that of the 10-acre field in the wet and cold season of 1862, was there any third cut at all without sewage, whilst, with sewage, four or more cuttings were always obtained, and the later crops were pretty uniformly the larger the larger the quantity of sewage applied.

Leaving the question of the amounts of produce obtained during each separate month, or at each successive cutting, Table IV. shows the total amount of produce on each plot, in each of the three seasons, and also the amount of increase for every 1,000 tons of sewage applied; and produce and increase are each recorded both as green grass, and calculated as hay. The means of the results obtained in the two fields are also given.

TABLE IV.—Total Amounts of Produce, and the Increase for 1,000 Tons of Sewage applied, both reckoned as Green Grass, and calculated as Hay.

SEASONS 1861, 1862, and 1863.

	Five-acre Field.				Ten-acre Field (half).				Mean of the two Fields.			
	Without Sewage.	With Sewage.			Without Sewage.	With Sewage.			Without Sewage.	With Sewage.		
	Plot 1.	Plot 2.	Plot 3.	Plot 4.	Plot 1.	Plot 2.	Plot 3.	Plot 4.	Plot 1.	Plot 2.	Plot 3.	Plot 4.
Produce per Acre, per Annum, as Green Grass.												
	tons. cwts. qrs. lbs.	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*
1861 - -	9 5 3 5	14 16 3 8	27 1 0 10	32 16 3 8	8 18 0 15	15 16 3 2	22 15 2 12	26 13 3 12	9 1 3 24	15 6 3 5	24 18 1 11	29 15 1 10
1862 - -	8 3 1 10	27 18 0 18	34 10 0 19	32 9 2 22	16 10 0 25	27 11 0 20	32 2 1 14	31 12 1 20	12 6 3 1	27 14 2 19	33 6 1 3	32 1 0 7
1863 - -	4 18 3 13	22 5 0 11	34 18 1 27	37 0 2 5	8 0 3 19	25 5 1 8	30 11 2 12	34 19 1 21	6 9 3 16	23 15 0 24	32 15 0 6	35 19 3 27
Average -	7 9 1 9	21 13 1 12	32 3 1 0	34 2 1 12	11 3 0 10	22 17 3 1	28 9 3 13	31 1 3 18	9 6 0 24	22 5 2 7	30 6 2 6	32 12 0 15
Produce per Acre, per Annum, calculated as Hay.*												
1861 - -	2 19 0 17	4 3 1 24	6 3 0 0	7 5 0 27	2 11 1 24	3 15 2 20	4 9 1 6	5 5 1 4	2 15 1 7	3 19 2 8	5 6 0 17	6 5 1 2
1862 - -	2 10 1 23	6 8 2 13	5 19 2 15	6 2 0 11	4 13 3 4	5 17 3 16	5 14 1 5	6 10 1 15	3 12 0 14	6 3 1 1	5 16 3 24	6 6 0 27
1863 - -	2 2 0 10	5 4 0 22	6 2 1 1	7 1 0 12	3 7 2 27	5 0 3 18	6 4 1 25	6 12 3 2	2 14 3 19	5 2 2 6	6 3 1 13	6 16 3 22
Average -	2 10 2 7	5 5 1 20	6 1 2 15	6 16 0 17	3 11 0 0	4 18 0 18	5 9 1 3	6 2 3 7	3 0 3 4	5 1 3 5	5 15 1 23	6 9 1 26
Increase, reckoned as Green Grass, for each 1,000 Tons of Sewage applied.												
1861 - -	..	2 19 1 7	4 0 1 9	3 16 2 6	..	4 19 3 23	4 18 3 23	4 4 0 20	..	3 19 2 15	4 9 2 16	4 0 1 13
1862 - -	..	6 11 3 23	4 7 3 16	2 14 0 13	..	3 13 2 20	2 12 0 4	1 13 2 7	..	5 2 3 8	3 9 3 24	2 3 3 10
1863 - -	..	5 15 1 22	4 19 3 21	3 11 1 4	..	5 14 3 1	3 15 0 13	2 19 3 10	..	5 15 0 12	4 7 2 3	3 5 2 7
Average -	..	5 2 0 27	4 9 1 15	3 7 1 8	..	4 16 0 15	3 15 1 13	2 19 0 22	..	4 19 0 21	4 2 1 14	3 3 1 1
Increase, calculated as Hay, for each 1,000 Tons of Sewage applied.*												
1861 - -	..	0 12 3 20	0 14 1 21	0 13 3 27	..	0 17 2 8	0 13 2 6	0 12 3 3	..	0 15 1 0	0 14 0 0	0 13 1 15
1862 - -	..	1 6 0 14	0 11 2 5	0 7 3 25	..	0 8 0 4	0 3 1 19	0 4 0 7	..	0 17 0 9	0 7 1 26	0 6 0 2
1863 - -	..	1 0 2 23	0 13 1 13	0 11 0 0	..	0 11 0 6	0 9 1 23	0 7 0 25	..	0 15 3 15	0 11 1 18	0 9 0 13
Average -	..	0 19 3 19	0 13 0 13	0 10 3 27	..	0 12 0 25	0 8 3 7	0 8 0 2	..	0 16 0 8	0 10 3 24	0 9 2 1

* The amount of hay to which the grass is supposed to be equivalent, is calculated by raising the amount of the experimentally determined perfectly dry or solid substance in the grass, in the proportion of from 84 to 100, on the assumption that the hay would contain 84 per cent. of dry substance and 16 per cent. moisture.

In the first and third years (1861 and 1863) there was, in both fields, more produce, whether reckoned as green grass or as hay, with each increased amount of sewage applied. In the wet and cold season of 1862, however, although there was considerably more green produce per acre from 6,000 tons of sewage than from 3,000, yet, owing to its more succulent condition, the amounts with the larger quantities of sewage represented even a few cwts. less of hay. On the other hand, with 9,000 tons of sewage, the produce of green grass was, in this wet season, in both fields, less than with 6,000 tons, but calculated as hay it was slightly more. In no case, however, is the increase with the larger amounts of sewage in proportion to the increased application. This point is well illustrated in the two lower sections of Table IV., which give, not the produce per acre, but the increase for each 1,000 tons of sewage applied, reckoned respectively as green grass and as hay.

It is obvious that the proportion of the produce to be reckoned as increase due to the sewage applied must depend very much on the yield of the unmanured land with which the produce of the sewaged land is to be compared. It is necessary, therefore, to bear in mind the quality and condition of the land upon which the experiments were made, when estimating and judging of the amounts of increase yielded for a given amount of sewage applied. Both fields were fattening pastures. It may safely be concluded, therefore, that their natural or unmanured produce would be higher than that of the average of such land as would be likely to be devoted to the growth of grass by means of sewage on the large scale. On the other hand, there is no reason to suppose that under the influence of a liberal supply of sewage, the produce would be in a corresponding degree higher on land of high natural yield than on land which, from its suitable physical qualities, might, with sewage, yield heavy crops, but without it, very light and poor ones. Then, again, a large proportion of the grasses of a good fattening pasture will yield less produce under the influence of sewage than others associated with them, and it is not until the application has been continued for some years that the more freely growing grasses become so far dominant as to secure the maximum result for a given amount of sewage that soil and season will admit of. For these reasons it seems probable that the amounts of *increase* obtained for a given amount of sewage, applied in these experiments, are more likely to be below than above those which may be anticipated on the continued application of sewage, over large areas of land, selected, prepared, and properly seeded for the purpose.

As between the two fields, it should be stated that, to the five-acre field no sewage had been applied during the season preceding the commencement of the experiments; one crop of hay had been taken from it, and it had afterwards been eaten down by sheep. To the ten-acre field, however, sewage had been applied in indefinite quantity for nearly 12 months; two crops of hay had been taken from the land in the previous year, and it had been kept very closely grazed down by stock, almost up to the time of

commencing the experiment. Thus, though the land of this field was undoubtedly of higher natural quality, and was probably also in a higher condition, so far as the influence of recent manuring was concerned, yet, owing to its herbage being so much more closely grazed down, it was in that respect in a less favourable condition for the first year's crop, and accordingly, in the first season, gave, without sewage, less produce than the other, though in succeeding seasons it gave much more. Indeed, whilst in the five-acre field the produce without sewage diminished from year to year, being even less in the second year than in the first, notwithstanding the much larger amount of rain, it was in the ten-acre field so very much larger in the second year than in the first, and so very much larger in both the second and third years in that field than in the other, that it was thought, until full inquiry had been made, that there must be some error either in the measurement of the land or in the records. None was, however, found; and the difference in the character and composition of the two soils, which subsequent examination showed, satisfactorily accounted for the great difference in their natural yield. For further information on this point see p. 63.

These few remarks on the character and condition of the land in the two fields will serve as some explanation of the proportionally much greater difference in the amounts of increase over the natural produce from a given amount of sewage, than in the amounts of total produce per acre, where the same amounts of sewage are applied in the different fields, or in different seasons. A few comments only need be made on the results themselves as recorded in the Table.

In the first season the sewage was not applied experimentally until March in the five-acre, and April in the ten-acre field, and hence the amounts of increase of produce yielded had to be reckoned as due to comparatively small quantities of sewage applied. Taking the average result of the two fields, the increase obtained for 1,000 tons of sewage applied, when reckoned as green grass, was rather more when the two larger than when the smallest quantity of sewage was applied per acre, but reckoned at one uniform condition of dryness as hay, it was slightly less with each increased amount of sewage applied.

In the wet and cold season of 1862, which was, of course, favourable for the unsewaged land, and by comparison the less appropriate the greater quantity of sewage applied, the amount of increase for 1,000 tons of sewage, whether reckoned as green grass or as hay, diminished considerably with each increase of sewage applied per acre. And notwithstanding the amounts of total produce per acre with equal quantities of sewage were not very different in the two fields, the amounts reckoned as increase for 1,000 tons of sewage applied were very much less in the ten-acre than in the five-acre field, owing to the much larger produce without sewage in the former.

In 1863 again, though a much warmer and more genial season for the action of sewage, there was still, though in a much less

degree than in 1862, a diminishing proportion of increase for 1,000 tons of sewage, the larger the quantity applied per acre. There was also, owing chiefly to the much larger produce without sewage, much less to be reckoned as increase for each 1,000 tons of sewage applied in the ten-acre than in the five-acre field.

It is worthy of remark, that although the produce per acre without sewage is so much the greater in the ten-acre field than in the other, it is with equal, but especially with the larger amounts of sewage, pretty uniformly the greater in the five-acre field. This result was doubtless partly due to its being better fitted, from its porosity, for sewage irrigation, but partly also to the fact, that whilst it was comparatively flat, allowing the sewage to pass over it more slowly and so to be better absorbed, the ten-acre field was in high ridges, and steeply inclined, rendering it difficult to prevent the water running over it too quickly. This point will be illustrated further on by reference to the comparative composition of the drainage water from the two fields.

Taking the average results of the three years, and the two fields, we have, with sewage applied at the rate of 3,000 tons per acre per annum a produce per acre of a little over $22\frac{1}{4}$ tons of green grass, equal rather more than 5 tons of hay; with 6,000 tons of sewage rather more than $30\frac{1}{4}$ tons of green grass, equal rather more than $5\frac{3}{4}$ tons of hay; and with 9,000 tons of sewage rather more than $32\frac{1}{2}$ tons of green grass, equal about $6\frac{1}{2}$ tons of hay.

The largest quantities of produce reached were those obtained with the largest quantities of sewage (9,000 tons per acre per annum), and in the third year of the experiments, amounting in the five-acre field to 37 tons of green grass, equal rather more than 7 tons of hay, and in the ten-acre field to nearly 35 tons of green grass, equal nearly 6 tons 13 cwts. of hay.

The average increase of green grass over the natural produce for 1,000 tons of sewage applied was, with 3,000 tons of sewage per acre nearly 5 tons, with 6,000 tons of sewage rather more than 4 tons, and with 9,000 tons not quite $3\frac{1}{4}$ tons. Reckoned as hay, the average increase for 1,000 tons of sewage was, with 3,000 tons of sewage per acre 16 cwts., with 6,000 tons nearly 11 cwts., and with 9,000 tons $9\frac{1}{2}$ cwts. As, however, these average results relating to increase include those of the ten-acre field, where, owing to the very high natural produce, the amount reckoned as increase due to sewage was comparatively small, it is probable that results equal at any rate to those of the five-acre field may be expected in the average of cases elsewhere; and where, as may frequently happen, a soil which yields a very small natural produce, may, nevertheless, owing to its physical qualities, be well adapted for the application of sewage and give large amounts of produce per acre under its influence, the amounts of increase for a given amount of sewage applied may be even considerably higher than those obtained in the five-acre field.

The general result is, that there was much more total produce per acre with 6,000 tons of sewage than with 3,000, and more still

with 9,000; but that the increase for a given amount of sewage applied was less with 9,000 tons than with 6,000, and less with 6,000 than with 3,000.

The increase in the amount of produce with each increase in the quantity of sewage applied appears proportionally greater when reckoned as green grass than as hay. This is due to the much greater succulence, and, therefore, less proportion of dry substance in the more highly sewaged and heavier crops. The question arises, whether, with a less proportion of dry substance in the sewaged grass, a given weight of that dry substance will have a greater or a less value as food for stock than an equal weight from the less succulent unsewaged grass? This point will be fully considered in subsequent Sections of the Report.

II. *Experiments with Italian Rye-grass.*

In April 1863 arrangements were made with Mr. Campbell for gauging the sewage applied, and weighing and sampling the produce obtained, in a field of Italian rye-grass, and also for trying the feeding qualities of the grass. From the field in question, a crop of tares, which had been manured with farm-yard dung, had been carried off in the spring of 1862. The land was then cleaned, again manured with stable and farm-yard dung, and sown down with rye-grass in September (1862); and, at the time of commencing the experiment in the following Spring, there was a promising and tolerably even crop.

Three plots of about an acre each were set apart; plot 1 to be unsewaged; plot 2 to receive sewage at the rate of 3,000; and plot 3 at the rate of 6,000 tons per acre per annum. So meagre was the flow, however, that up to the end of October (1863) only 787 tons had been applied to plot 2, and 1,522½ tons to plot 3, instead of 1,512 and 3,057 tons, respectively, that were required according to the rates intended, reckoning from the date of the first application in the Spring.

The particulars of the amounts of sewage applied, and of the amounts of produce and increase obtained, reckoned both as green grass and in the condition of dryness of hay, are given in Table V., p. 17. Further details will be found in Appendix, Table V., pp. 97–100.

TABLE V.—Amounts of Sewage applied, and of Produce and Increase obtained, in Experiments on Italian Rye-grass.

SEASON 1863.

	Without Sewage.	With Sewage.	
	Plot 1.	Plot 2.	Plot 3.
Sewage applied per Acre.			
		Tons.	*Tons.*
April - - -	..	..	48·0
May - - -	..	152·1	257·6
June - - -	..	178·0	354·7
July - - -	..	218·1	403·1
August - -	..	120·8	163·4
September - -	..	60·1	219·9
October - -	..	58·1	75·9
Total - -	..	787·2	1522·6

	Plot 1.				Plot 2.				Plot 3.			
Rye-grass obtained per Acre, during each separate Month.												
	Tons	*cwts.*	*qrs.*	*lbs.*	*Tons*	*cwts.*	*qrs.*	*lbs.*	*Tons*	*cwts.*	*qrs.*	*lbs.*
April - - -	3	4	1	21	4	3	1	22	3	15	3	15
May - - -	1	17	2	23	–	–	–	–	1	11	1	7
June - - -	8	18	0	22	7	1	1	27	6	9	3	13
July - - -	–	–	–	–	5	16	3	21	6	10	2	21
August - -	2	0	1	13	1	14	1	13	3	0	2	10
September - -	0	9	2	7	0	13	1	6	1	12	0	11
October - -	0	6	0	9	1	5	3	16	2	3	0	12
	16	16	0	19	20	15	1	21	25	3	2	5
Rye-grass obtained per Acre, in each successive Crop.												
1st Crop - -	5	2	0	16	4	3	1	22	3	15	3	15
2d Crop - -	8	18	0	2	7	1	1	27	5	14	0	3
3d Crop - -	2	0	1	13	5	16	3	21	7	7	1	13
4th Crop - -	0	9	2	7	1	14	1	13	4	2	2	23
5th Crop - -	0	6	0	9	0	13	1	6	2	0	1	23
6th Crop - -	–	–	–	–	1	5	3	16	2	3	0	12
	16	16	0	19	20	15	1	21	25	3	2	5
Summary of Produce per Acre.												
Green Grass - -	16	16	0	19	20	15	1	21	25	3	2	5
Reckoned as Hay* -	4	18	3	8	5	5	0	16	5	12	2	11
Increase of Produce per Acre.												
As Green Grass -	..				3	19	1	2	8	7	1	14
Reckoned as Hay* -	..				0	6	1	8	0	13		3
Increase for each 1,000 Tons of Sewage applied.												
As Green Grass -	..				5	0	2	25	5	9	3	17
Reckoned as Hay* -	..				0	8	0	4	0	9	0	5

* The amount of hay to which the grass is equivalent is calculated by raising the amount of the experimentally determined perfectly dry or solid substance in the grass, in the proportion of from 84 to 100, on the assumption that the hay would contain 84 per cent. of dry substance and 16 per cent. moisture.

When the experiment with rye-grass was determined upon early in April, the grass was so far forward that it was found necessary to take a first cutting without sewage, before the

water-runs could be properly adapted for the separate irrigation of the respective plots, and hence but little sewage was applied before the end of April, and that little only on plot 3. The effect of the sewage was, therefore, as the second and third divisions of the Table show, to increase the produce chiefly during the later months and later crops of the season, and it did so very much in proportion to the amounts applied.

The total produce per acre was, without sewage (though otherwise pretty well manured), rather more than 16¾ tons, with 787 tons of sewage rather more than 20¾ tons, and with 1,522½ tons of sewage nearly 25¼ tons of green grass; or, reckoned at a uniform condition of dryness as hay, the amounts were equivalent to 4 tons 18¾ cwts., 5 tons 5¼ cwts., and 5 tons 12½ cwts. respectively. The increase of produce per acre was, therefore, nearly 4 tons of green grass due to the smaller, and about 8 tons 7½ cwts. due to the larger application of sewage; though the increase in real dry substance represented only 6¼ cwts., and 13¾ cwts. of hay, respectively.

The increase reckoned for 1,000 tons of sewage in each case was, with the smaller quantity applied, 5 tons 0¾ cwts., and with the larger quantity, nearly 5 tons 10 cwts. of green grass; but the increase of real dry substance represented only 8 cwts., and 9 cwts. of hay, respectively. The increase in real dry or solid substance was, therefore, very small; but it will be seen further on that, at any rate in the case of the meadow grass (and it is probably the same with the rye-grass), a given amount of the dry substance of the sewaged produce was more productive of milk, and even slightly more of increase, than an equal amount of the dry substance of the unsewaged.

The general result is, that there was as much or more increase of green produce for 1,000 tons of sewage with the rye-grass than in most of the cases in the same season with the meadow-grass, where so very much larger quantities of sewage were applied, though the increase of dry substance reckoned as hay was generally the higher with the meadow-grass. That is to say, the comparatively large amounts of sewage applied to the meadow-grass gave, on the average, a larger amount of increase in dry or solid substance, for a given quantity of sewage, than the much smaller amounts applied to the rye-grass. It is also to be observed that there was a larger amount of increase, both of green grass and of dry substance reckoned as hay, for a given quantity of sewage on plot 3 with the larger, than on plot 2 with the smaller amount applied to the rye-grass. The facts point to the conclusion that, for the season in question, the larger quantity applied was below that required to yield the maximum increase for a given amount of sewage. It is obvious, however, that it may be advantageous even to pass this point; for, within certain limits, it will be economical to reduce the area and cost of distribution at the expense of a certain sacrifice of sewage.

It is to be regretted that the plant of rye-grass was so much injured by frost during the winter of 1863–4 (and it was the more

TABLE VI.—Summary of the Results of the Feeding of Oxen on Unsewaged and Sewaged Meadow Grass alone, and with Oilcake in addition.

Seasons 1861 and 1862.

Plots, &c.	Consumed per Head per Day.				Consumed per 1,000 lbs. Live-weight per week.				Consumed to produce 100 lbs. Increase in Live-weight.				Increase in Weight per 1,000 lbs. Live-weight per Week.	Results calculated per Acre.						Results calculated per 1,000 tons sewage applied.			
	Fresh Food.		Dry Substance of Food.		Fresh Food.		Dry Substance of Food.		Fresh Food.		Dry Substance of Food.			Oilcake consumed with the Produce of each Acre.	Time the Produce of each Acre (with Oilcake, if any,) would keep 1 Ox.	Amount of Increase in Live-weight the Produce of each Acre would yield.		Value of Increase in Live-weight from each Acre at 4*d.* per lb.		Amount of Increase in Live-weight from the increased Produce from 1,000 tons Sewage.		Value of Increase in Live-weight from the increased Produce from 1,000 tons Sewage.	
	Grass.	Oilcake.	In Grass.	In Oilcake.	Grass.	Oilcake.	In Grass.	In Oilcake.	Grass.	Oilcake.	In Grass.	In Oilcake.				Including the Oilcake consumed (if any).	Exclusive of Oilcake.*	Including the Oilcake consumed (if any).	Exclusive of Oilcake.*	Including the Oilcake consumed (if any).	Exclusive of Oilcake.*	Including the Oilcake consumed (if any).	Exclusive of Oilcake.*
Season 1861; Period of Experiment 16 weeks, May 27—Sept. 15; Food—Meadow Grass.																							
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs. ozs.	Lbs.	Weeks.	Lbs.	Lbs.	£ s. d.	£ s. d.	Lbs.	Lbs.	£ s. d.	£ s. d.
1. Unsewaged	89·8	..	23·7	..	576	..	152	..	23,669	..	6,246	..	2 7	..	33 3/7	..	88	..	1 9 4	..	..	..	..
2. Sewaged														..	45 1/7	..	134 1/2	..	2 4 10	..	24 3/4	..	0 8 3
3. Sewaged	105·2	..	21·3	..	668	..	135	..	24,735	..	5,000		2 11	..	82 2/7	..	245	..	4 1 8	..	35 1/2	..	0 11 10
4. Sewaged														..	90 6/7	..	297 1/4	..	4 19 2	..	34	..	0 11 4
Season 1862; Reckoning the Period of Experiment from May 8—Oct. 13=22 1/7 weeks †; Food—Meadow Grass and Oilcake.																							
1. Unsewaged	105·4	3·5	23·6	3·1	584	19·7	131	17·4	6,213	210	1,389	186	9 6	618 1/2	24 6/7	294 1/2	209 1/2	4 18 2	3 9 10	..	..	..	
2. Sewaged														1,766 3/4	70 6/7	908 1/4	665	15 2 9	11 1 8	205 1/4	152 1/4	3 8 5	2 10 0
3. Sewaged	126·1	3·5	20·9	3·1	704	19·9	117	17·6	6,883	195	1,141	172	10 4	2,164 3/4	87 1/7	1,123	822 3/4	18 14 4	13 14 3	138 1/4	102 1/4	2 6 1	1 14 1
4. Sewaged														2,056 3/4	82 2/7	1,057 1/4	774 1/4	17 12 5	12 18 1	84 3/4	62 3/4	1 8 3	1 0 11
Season 1862; Reckoning the Period of Experiment from June 5—Oct. 13=18 4/7 weeks ‡; Food—Meadow Grass and Oilcake.																							
1. Unsewaged	100·9	3·7	23·9	3·3	535	19·5	127	17·2	8,489	310	2,010	274	6 5	668	25 6/7	215 1/2	120 3/4	3 11 10	2 0 3	..	..	..	..
2. Sewaged														1,868 3/4	72 3/7	685 1/4	420 3/4	11 8 7	7 0 3	157 1/4	100 1/4	2 12 5	1 13 5
3. Sewaged	123·2	3·7	20·9	3·3	658	19·7	112	17·4	9,115	273	1,549	241	7 4	2,310 3/4	9 1/7	848	520 1/4	14 2 8	8 13 5	105 1/2	66 3/4	1 15 2	1 2 3
4. Sewaged														2,175 1/4	84 2/7	798 1/4	489 3/4	13 6 1	8 3 3	04 3/4	41	1 1 7	0 13 8

* The *value* of the increase in live-weight, "exclusive of oilcake," is reckoned by deducting the cost of the cake consumed, less the estimated value of the manure it yields, from the gross value inclusive of oilcake; and the *amount* of increase in live-weight, "exclusive of oilcake," by deducting from the gross increase with oilcake, at the rate of 1 lb. for every 4*d.* of deducted value. In further explanation it may be observed, that when the cheaper cakes, such as rape-cake or cotton-cake, were used, a very much larger proportion of the cost was chargeable against the manure, and therefore very much less against the animals, than when linseed-cake was employed. Such estimates are, however, obviously only approximations to the truth.

† This period includes the first three weeks during which the two oxen, otherwise fed on unsewaged grass, received sewaged grass.

‡ This period excludes the first month of the experiment, during th[illegible] weeks of which the two oxen, otherwise fed on unsewaged grass, received sewaged grass.

so where the sewage had been the most liberally applied), that it was necessary to plough it up, otherwise the experiment would have been continued through the season of 1864. Instead of this, barley was sown over the three plots without any further manure, and it was obvious to the eye during growth that the crop was much heavier where sewage had been applied to the rye-grass than where it had not, and heavier where the larger than where the smaller quantity had been applied.

III. *Experiments with fattening Oxen.*

As in 1861, so in 1862, 10 oxen were purchased and tied up in a shed to consume the grass from the five acre field; two to be fed on unsewaged, and the remaining eight on sewaged grass; the latter to be cut, as ready, indiscriminately from the three sewaged plots. In 1861, the animals had grass alone for the first 16 out of the 20 weeks of the whole experiment, and they had oilcake in addition (four pounds per head per day) only during the concluding four weeks. The object was to try grass alone in the first season, and the result was very unfavourable. In 1862, oilcake was given in addition to the grass from the commencement, in quantity which, averaged over the whole period of nearly 23 weeks, amounted to about 3½ lbs. per head per day.

The detailed records of the experiments in 1861 were given in the Appendix to the last Report, and those of the experiments of 1862 will be found in Tables VI. to VIII., pp. 101–108, in the Appendix to the present Report. Table VI. (opposite) summarises, and brings together at one view, the results obtained in 1861 on grass alone, and those in 1862, on grass with oilcake in addition. The upper division of the Table relates to the experiments of 1861; the middle one to the whole period of experiment of 1862, including the first four weeks during three of which the oxen professedly on unsewaged grass, had (for want of supply) sewaged grass; and the lower division represents the results exclusive of the first month. Inasmuch as both lots increased very much more during the first month than afterwards, the rate of increase on the whole would appear comparatively small if that period were omitted; whilst, including it, included also the period of three weeks during which the two oxen had sewaged grass. It was thought better, therefore, to give the results both ways. The comparison between the effects of the unsewaged and the sewaged grass is, however, much the same whichever period be adopted.

In both years a greater weight of the fresh sewaged grass was consumed per head per day, and per 1,000 lbs. live-weight per week, than of the less succulent unsewaged grass; but the dry or solid substance contained in the larger amount of sewaged grass consumed was less than that in the unsewaged. Again, when, as in 1861, grass was given alone, more of the sewaged than of the unsewaged, reckoned in the green or fresh state, was required to produce 100 lbs. increase in live-weight; though

the amount of dry substance contained in the sewaged grass so required was only about four fifths as much as that in the unsewaged grass. But when, as in 1862, a fair allowance of oilcake was given in addition, very much less both of fresh food and of dry or solid substance of food were required to produce 100 lbs. increase in live-weight than in 1861 with grass alone, and considerably less of the dry or solid substance of the more succulent sewaged than of the drier unsewaged grass was required.

It is also observable, that, reckoned in the green state, about the same amount both of the unsewaged and sewaged grass was consumed per 1,000 lbs. live-weight per week in 1862 with oilcake in addition, as in 1861 with grass alone; but the dry substance supplied in the grass consumed in 1862, with oilcake, was, both with the unsewaged and the sewaged grass, less than in 1861 without it.

The result in 1861, when cut grass was given alone, was extremely unsatisfactory, the amount of food required to produce a given amount of increase being unusually large, and the rate of increase on a given weight of animal within a given time unusually small. But when, in 1862, oilcake was given with the grass, and especially when given with the sewaged grass, very much better results were obtained. Indeed, in 1862, the rate of increase per 1,000 lbs. live-weight per week (if taken over the whole period of nearly 23 weeks) was, both with unsewaged and with sewaged grass (and oilcake in addition), about equal to the average obtained with animals of fair quality fed on good fattening food; but the food consumed for the production of 100 lbs. of increase, even in the case of the sewaged grass, contained more dry or solid substance than is usually required when oxen are liberally fed on oilcake, hay-chaff, and roots, and with the unsewaged grass considerably more. It should be borne in mind, however, that the experiment with unsewaged grass was on two animals only, whilst that with the sewaged was on eight, giving, therefore, a much more trustworthy average; and the results given in Appendix, Table VII. p. 107, show that one of the two oxen on unsewaged grass gave less increase than any of those on the sewaged, whilst the other gave considerably more than the average increase of the latter.

The general result is that the sewaged grass cut green and given to oxen tied up under cover, gave, when supplemented with a fair allowance of oilcake, a good average rate of increase in relation to the weights of the animals within a given time, and also a moderate rate of increase in relation to the amount of dry or solid substance provided in the food consumed.

It remains to say a few words on the last ten columns of Table VI.

It is seen that, by the aid of sewage, the time which an acre of land would provide food for an ox was increased three or more fold, varying according to the amount of sewage employed. Taking into account, however, the large amounts of oilcake consumed with the produce of each acre in 1862, it results

that (excepting on plot 2, where the produce was very much larger than in 1861) a given area would support considerably less stock in the cold and wet season of 1862 than in the more genial one of 1861.

The amount of increase in live-weight yielded from the produce of an acre was also increased several fold by means of sewage; about three-fold with the highest amount of sewage when the grass was consumed alone, and nearly four-fold in 1862, when oilcake was given in addition, in much about the same proportion to a given amount of the unsewaged and the sewaged grass.

It was shown in the last Report how very small was the gross money value of the increase in live-weight obtained from the consumption of the produce of an acre, or of the increased produce from 1,000 tons of sewage, when the grass was consumed alone, and the results then referred to are given in the upper division of the Table to compare with those in the lower divisions relating to 1862, when oilcake was also used. The result is seen to be, that the money value of the increase in live-weight from the produce of an acre of sewaged land, or from the produce of 1,000 tons of sewage, was very much greater in 1862, when oilcake was given, than in the corresponding cases in 1861 without it. The money return per acre was also from three to four times as great with sewage as without it, and although it is greater where 9,000 or 6,000 than where only 3,000 tons of sewage were applied, yet the return calculated, not per acre, but for each 1,000 tons of sewage, is, in each case, the less the greater the amount applied.

The next section of the Report will show that a very much higher money value was obtained both from an acre of land, and from a given amount of sewage, when the sewaged grass was employed for the production of milk instead of meat. But it may be mentioned that at Croydon, although the land is there more liberally sewaged than was the case in any of the Rugby experiments, satisfactory results have been obtained with fattening stock fed on the land. The practice there is, to irrigate for three or four days and nights together two or three times for each crop, and when the grass has got a sufficient head, to stop the application and turn the stock upon the land, where they remain until the grass is closely eaten down; they are then removed, the land is re-irrigated, and so on.

IV. *Experiments with Milking Cows.*

By the kindness of Mr. Campbell, experiments were made with his cows each year, 1861, 1862, and 1863, on the milk-yielding qualities of the grass.

In 1861, 12 of Mr. Campbell's cows were carefully selected and set apart to be fed on grass alone, 2 on unsewaged and 10 on sewaged grass, and the experiment was so conducted over a period of 16 weeks. It was afterwards continued for 4 weeks longer with an allowance of oilcake as well as grass.

In 1862, 3 cows were selected to receive oilcake and unsewaged, and 12 oilcake and sewaged grass, and the experiment was continued for 24 weeks.

In 1863, 20 recently calved cows were selected, 5 to be fed on unsewaged meadow grass, 10 on sewaged meadow grass, and 5 on Italian rye grass. The design was to give each lot grass alone for the first 12 weeks, and afterwards a certain amount of oilcake in addition.

The detailed records of the experiments with cows in 1861 were given in the Appendix to the last Report; and those of the experiments in 1862 and 1863 will be found in Tables IX. to XIV., pp. 109–162, in the Appendix to the present Report. The results of all the experiments are given, in a condensed form, at one view, in Table VII. opposite.

Leaving the more detailed Tables for reference, to supply any further illustrations or explanations that may be needed, it will be sufficient to make a few comments on the main facts brought to view in the last-mentioned summary Table.

Reviewing the results of the experiments in which sewaged was tried against unsewaged meadow grass, it is observable that, excepting in the first season (1861), the cows required more both per head per day, and per 1,000 lbs. live weight per week, of the fresh or green sewaged than of the unsewaged grass; yet, the yield of milk, both per head and per 1,000 lbs. live weight, was, without exception, the greater with the unsewaged grass. The increase in live weight was also somewhat the greater on the unsewaged grass in 1861 and 1862, but the contrary was the case in 1863.

Reckoned in the fresh or green state in which it was cut and carted, there was, in fact, in every case but one (and then the quantities were equal), considerably less of the unsewaged than of the sewaged grass required to be consumed for the production of one gallon of milk. It should be remarked, however, that the unsewaged grass was generally cut in a much riper and less succulent condition, and therefore contained a considerably higher per-centage of dry or solid substance than the sewaged. It may be also here mentioned that in 1863 the cows having professedly unsewaged meadow grass, in default of a sufficient supply of it, had necessarily for a considerable part of each of the periods of 12 weeks unsewaged rye-grass.

Weight for weight, in the fresh or green state in which the grass was cut, weighed, and given to the cows, the unsewaged grass has, therefore, proved to be far more productive than the sewaged. But when the comparison is made, not between the amounts of grass reckoned in the fresh state, but between the amounts of dry or solid matter which the different descriptions of grass supplied, the result is that, in only one instance was there more, and in the others there was either an equal amount or even less of dry or solid substance of sewaged than of unsewaged grass required for the production of a given amount of milk.

The general result in regard to these points was, then, that in both milk and increase, but especially milk, a given weight of

Table VII.—Summary of the Results of the Feeding of Cows on Unsewaged Meadow Grass, on Sewaged Meadow Grass, and on Italian Rye Grass (Unsewaged and Sewaged), each alone, and with Oilcake in addition.*

Seasons 1861, 1862, and 1863.

Plots, &c.	Consumed per Head per Day. Fresh Food. Grass.	Consumed per Head per Day. Fresh Food. Oilcake.	Consumed per Head per Day. Dry Substance of Food. In Grass.	Consumed per Head per Day. Dry Substance of Food. In Oilcake.	Consumed per 1,000 lbs. Live-weight per Week. Fresh Food. Grass.	Consumed per 1,000 lbs. Live-weight per Week. Fresh Food. Oilcake.	Consumed per 1,000 lbs. Live-weight per Week. Dry Substance of Food. In Grass.	Consumed per 1,000 lbs. Live-weight per Week. Dry Substance of Food. In Oilcake.	Consumed to produce 1 Gallon of Milk. Fresh Food. Grass.	Consumed to produce 1 Gallon of Milk. Fresh Food. Oilcake.	Consumed to produce 1 Gallon of Milk. Dry Substance of Food. In Grass.	Consumed to produce 1 Gallon of Milk. Dry Substance of Food. In Oilcake.	Milk per Head per Day.	Per 1,000 lbs. Live-weight per week. Milk.	Per 1,000 lbs. Live-weight per week. Increase (or Loss) in Weight.	Results calculated per Acre.† Oilcake consumed with the Produce of each Acre.	Results calculated per Acre.† Time the Produce of each Acre (with Oilcake, if any,) would keep 1 Cow.	Results calculated per Acre.† Amount of Milk the Produce of each Acre would yield. Including the Oilcake consumed (if any).	Results calculated per Acre.† Amount of Milk the Produce of each Acre would yield. Exclusive of Oilcake.‡	Results calculated per Acre.† Value of the Milk from the Produce of each Acre at 8*d*. per Gallon. Including the Oilcake consumed (if any).	Results calculated per Acre.† Value of the Milk from the Produce of each Acre at 8*d*. per Gallon. Exclusive of Oilcake.‡	Results calculated per 1,000 tons Sewage applied.† Amount of Milk from the increased Produce from 1,000 tons of Sewage. Including the Oilcake consumed (if any).	Results calculated per 1,000 tons Sewage applied.† Amount of Milk from the increased Produce from 1,000 tons of Sewage. Exclusive of Oilcake.‡	Results calculated per 1,000 tons Sewage applied.† Value of the Milk from the increased Produce from 1,000 tons of Sewage at 8*d*. per Gallon. Including the Oilcake consumed (if any).	Results calculated per 1,000 tons Sewage applied.† Value of the Milk from the increased Produce from 1,000 tons of Sewage at 8*d*. per Gallon. Exclusive of Oilcake.‡
Season 1861; Period of Experiment 16 weeks, May 26—Sept. 14; Food—Meadow Grass.																									
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Weeks.	Gallons.	Gallons.	£ s. d.	£ s. d.	Gallons.	Gallons.	£ s. d.	£ s. d.
1. Unsewaged	150·2	..	35·8	..	994	..	237	..	62·2	..	14·8	..	24 7/8	134 3/4	8·59	..	10	..	321 5/8	..	10 14 3	..	..	..	..
2. Sewaged	124·0	..	22·7	..	846	..	155	..	02·2	..	11·4	..	20 1/2	140 3/4	7·33	..	40 6/7	..	570 5/8	..	19 0 6	..	179 3/4	..	5 19 10
3. Sewaged																..	58 3/7	..	820 3/8	..	27 6 11	..	178	..	5 18 8
4. Sewaged																..	08 6/7	..	961 3/8	..	32 0 10	..	151 3/8	..	5 0 11
Season 1862; Period of Experiment 24 weeks, May 2—Oct. 16; Food—Meadow Grass and Oilcake.																									
1. Unsewaged	127·2	3·5	25·2	3·1	862	23·8	171	21·1	55·5	1·53	11·0	1·36	23 5/8	160	6·83	1,020 1/2	41 1/2	666 1/8	613 1/4	22 4 5	20 8 10	..	..	..	..
2. Sewaged	149·2	3·0	23·0	3·2	941	24·1	154	21·4	67·1	1·72	11·0	1·52	21 1/2	144 3/4	4·60	1,531 1/4	62 2/7	920 5/8	835 1/4	30 13 8	27 16 10	84 5/8	74	2 16 5	2 9 4
3. Sewaged																1,843 1/4	73 3/7	1,072 1/4	973 5/8	35 15 2	32 8 11	67 1/4	60	2 5 2	2 0 0
4. Sewaged																1,814 1/2	72 1/7	1,056 1/2	958 1/4	35 4 1	31 18 10	43 1/4	38 3/8	1 8 10	1 5 7
Season 1863; First Period, 12 weeks, April 28—July 20; Food—Meadow Grass.																									
1. Unsewaged	99·1	..	27·9	..	650	..	133	..	36·2	..	10·2	..	28 1/4	185	4·37	..	21	..	402	..	13 8 0	..	..	..	..
2. Sewaged	142·9	..	25·2	..	933	..	169	..	52·2	..	9·2	..	28 3/8	190	6·70	..	53 1/7	..	1,019 1/8	..	33 19 5	..	205 3/4	..	6 17 2
3. Sewaged																..	73 3/7	..	1,401 7/8	..	46 16 7	..	167 1/2	..	5 11 5
4. Sewaged																..	80 1/7	..	1,544 1/8	..	51 9 5	..	126 7/8	..	4 4 7
Season 1863; Second Period, 12 weeks, July 21—Oct. 12; Food—Meadow Grass and Oilcake.																									
1. Unsewaged	90·5	3·9	24·4	3·5	563	24·1	151	21·5	32·7	1·40	8·8	1·25	28 1/2	177 1/2	1·82	623 3/4	23	444 3/8	431 1/4	14 16 3	14 7 6	..	..	..	..
2. Sewaged	172·0	3·7	25·1	3·3	1,076	22·9	157	20·4	68·2	1·46	10·0	1·30	26	162 1/2	2·02	1,134 3/4	44 1/7	780	756 1/4	26 0 0	25 4 2	111 3/8	108 3/8	3 14 7	3 12 3
3. Sewaged																1,504 1/4	61	1,075 1/8	1,042 3/8	35 16 9	34 14 11	105 5/8	101 7/8	3 10 1	3 7 11
4. Sewaged																1,719 1/2	67	1,181 5/8	1,145 3/4	39 7 9	38 3 10	81 3/8	79 3/8	2 14 7	2 12 11
Season 1863; Total Period, 24 weeks, April 28—Oct. 12; Food—First 12 weeks Meadow Grass, Second 12 weeks Meadow Grass and Oilcake.																									
1. Unsewaged	95·4	1·7	26·4	1·5	616	10·8	170	9·0	34·7	0·61	9·6	0·54	28 3/8	183	3·23	255 1/2	21 6/7	419 3/8	414	13 19 7	13 10 0	..	..	..	..
2. Sewaged	157·4	1·8	25·1	1·6	1,041	12·1	106	10·8	59·9	0·70	9·6	0·62	27 1/8	179	4·39	620	48 2/7	888 1/2	875 5/8	29 12 4	29 3 9	156 3/8	153 7/8	5 4 3	5 2 7
3. Sewaged																854 3/4	66 4/7	1,224 3/4	1,206 7/8	40 16 6	40 4 7	134 1/4	132 1/8	4 9 6	4 8 1
4. Sewaged																939 1/4	73 3/7	1,346 1/8	1,326 1/2	44 17 5	44 4 4	103	101 3/8	3 8 8	3 7 7
Season 1863; First Period, 12 weeks, April 28—July 20; Food—Italian Rye Grass.																									
1. Unsewaged	159·3	..	31·7	..	1,036	..	206	..	52·3	..	10·4	..	31 3/8	204	6·03	..	33 1/7	..	720	..	24 0 0	..	..	..	..
2. Sewaged																..	41 5/7	..	889 3/4	..	29 13 3	..	215 7/8	..	7 3 11
3. Sewaged																..	50 4/7	..	1,078 1/2	..	35 19 0	..	235 3/8	..	7 16 11
Season 1863; Second Period, 12 weeks, July 21—Oct. 12; Food Italian Rye Grass and Oilcake.																									
1. Unsewaged	121·3	3·3	28·0	3·0	763	20·9	176	13·6	44·4	1·22	10·2	1·09	28 1/8	177 1/4	−0·60	1,033	44 3/7	848 1/4	827	23 5 6	27 11 4	..	..	..	..
2. Sewaged																1,276 1/2	54 6/7	1,018 3/5	1,022 1/8	34 13 11	34 1 5	254 1/4	247 7/8	8 9 6	8 5 3
3. Sewaged																1,547 1/4	66 3/7	1,270 5/8	1,238 7/8	42 7 1	41 5 11	277 3/8	270 3/8	9 4 11	9 0 3
Season 1863; Total Period, 24 weeks, April 28—Oct. 12; Food—First 12 weeks Italian Rye Grass, Second 12 weeks Italian Rye Grass and Oilcake.																									
1. Unsewaged	142·5	1·5	30·1	1·3	929	9·6	196	8·5	49·0	0·51	10·3	0·45	30	195 3/4	2·58	388 3/4	37 5/7	768 1/4	760 1/4	25 12 2	25 6 10	..	..	..	..
2. Sewaged																480 3/4	46 4/7	949 1/2	939 5/8	31 13 0	31 6 5	230 1/8	227 7/8	7 13 5	7 11 11
3. Sewaged																582 1/4	56 4/7	1,150 7/8	1,138 7/8	38 7 3	37 19 3	251 1/8	248 5/8	8 7 5	8 5 9

* In the preparation of this Table the calculations are not based upon the results obtained during the whole of each of the "Periods" of experiment as above defined, those obtained during any part of a "Period" when, for want of a sufficient supply, the animals received any other than their proper description of grass, being as far as possible excluded. The exceptions so made relate chiefly to the experiments with unsewaged grass, the supply of which, as will be readily understood, was not so regular throughout the seasons as that of the sewaged; and hence it is, that the amounts of oilcake put down as consumed per head per day do not appear precisely the same for the cows on the unsewaged and those on the sewaged grass, although in point of fact the allowance, at parallel periods, and consequently throughout the whole period, was always the same for both.

† In the experiments with meadow grass in 1863, the produce of the two fields being employed indiscriminately as ready, the calculations are based upon the mean produce per acre, and increase per 1,000 tons of sewage, in the two fields.

‡ The *value* of the milk, "exclusive of oilcake," is reckoned by deducting the cost of the cake consumed, less the estimated value of the manure it yields, from the gross value inclusive of oilcake; and the *amount* of milk, "exclusive of oilcake," by deducting from the gross amount of milk with oilcake at the rate of one gallon for every 8*d*. of deducted value. In further explanation it may be observed, that when the cheaper cakes, such as rape-cake and cotton-cake, were used, a very much larger proportion of the cost was chargeable against the manure, and therefore very much less against the animals, than when linseed-cake was employed. Such estimates are, however, obviously only approximations to the truth.

animal was more productive when fed on unsewaged than on sewaged grass, and that a given weight of fresh unsewaged grass was more productive than an equal weight of fresh sewaged grass; but that a given weight of dry or solid substance supplied in sewaged grass was more productive than an equal weight supplied in unsewaged.

A careful consideration of the results leads to the conclusion that there was some considerable variation in the quality of the grass in the three different seasons. It was obviously very inferior in the wet and cold season of 1862. There is also evidence of a considerably diminished productiveness of a given weight both of green sewaged grass and of the dry substance of sewaged grass towards the end of the season; though part of the falling off which the figures show is doubtless attributable to the changing condition of the cows themselves as the season advanced.

The experiments do not afford the means of strictly comparing the productive qualities of rye grass with those of meadow grass, or of sewaged with those of unsewaged rye grass. Thus, as already alluded to, the cows professedly fed on unsewaged meadow grass in 1863 had, during a considerable part of the experimental period, unsewaged rye grass; whilst those fed on rye grass had indiscriminately the unsewaged and the sewaged. The indication is, however, that somewhat more of the dry substance of the sewaged rye grass than of the sewaged meadow grass was required to produce a given result; though the difference is less during the later than the earlier period of the season. It is probable, indeed, that sewaged Italian rye grass deteriorates less towards the end of the season than sewaged meadow grass.

It remains to indicate, approximately, the increased yield of saleable produce, and the money value of that produce, from an acre of land, and from 1,000 tons of sewage, according to season, and to the amount of sewage applied.

The last ten columns of Table VII. refer to these points. In explanation of the figures there given it should be stated, that the estimates of the amount, and value, of the milk yielded per acre, are, in the case of each plot, based upon the total amounts of grass obtained per acre throughout the season, and upon the average rate of consumption and yield of milk during each separate period, on unsewaged grass in the case of plot 1., and on the mixed sewaged grass in that of plots 2, 3, and 4; and the estimates are framed so as to show, as far as practicable, the amount and value, both inclusive and exclusive of oil-cake when it was given, as will be better understood by reference to the columns in the Table, and the foot note relating thereto.

It is obvious that such estimates can only be approximations to the truth. But such they are, and considered as such only, they are little likely to mislead any acquainted with practical agriculture, and with the limits within which such calculations are and are not of general application.

Referring first to the experiments with meadow grass, the result (excluding the case of 1862, when the unsewaged crop in the ten-

acre field was so very large) was, that the produce of an acre without sewage was competent to feed one cow for from 19 to 23 weeks, varying according to the season, or whether the grass were consumed alone or with oil-cake in addition. The same area was, with the aid of 3,000 tons of sewage, rendered capable of providing keep for two to two and a half cows for the same period of time; or, as represented in the Table, for one cow from two to two and a half times as long, with 6,000 tons of sewage for three to three and a half times as long, and with 9,000 tons from three and a half to four times as long.

Represented in quantity of milk, in 1861, when the sewage was not applied until the Spring, the produce per acre was, without sewage, 321½ gallons, and with the different amounts of sewage 570¾, 820½, and 961¼ gallons, respectively. Reckoned according to the rate of consumption of grass and of the yield of milk during the first 12 weeks, or most favourable period, of the grass season of 1863, when, as in 1861, the grass was consumed alone, but unlike 1861 the sewage had been applied throughout the winter months, and when the cows being mostly newly calved were also in their most favourable condition, the estimated yield of milk reckoned upon the total produce of grass per acre was, without sewage 402 gallons, and with the different amounts of sewage 1,019, 1,404¾, and 1,544 gallons, respectively; or, so far as the sewaged plots were concerned, from one-half to two-thirds more per acre than in 1861 reckoned according to the rates of consumption and yield of milk over the whole of that season.

With the aid of the large quantities of oilcake stated in the Table, the yield of milk per acre in 1862, when the season was very favourable for the unsewaged but comparatively unfavourable for the sewaged land, was, without sewage 666½ gallons, and with the different amounts of sewage 920½, 1,072¾, and 1,056 gallons; and, according to the rates of consumption and yield of milk when oilcake was given during the latter half of the season of 1863, the yield of milk per acre calculated upon the total produce of grass throughout the season in each case was, without sewage 444¼ gallons, and with the different amounts of sewage 780, 1,075, and 1,181½ gallons respectively.

The general result is, that, on the sewaged plots, the yield of milk was at a less rate per acre with oilcake during the latter or inferior part of the season of 1863, than without it during the earlier or more favourable portion of the same season; but it was at much the same rates per acre during the latter or inferior part of the comparatively favourable season of 1863, as during the entire period of the unfavourable season of 1862. Lastly, on this point, the yield of milk per acre over the entire season of 1863, half without and half with oilcake, was higher than that of 1862 with oilcake throughout, and considerably so on the more highly sewaged plots.

So far as may be judged from the limited experience which these results record, it would appear probable that with an average supply of about 5,000 tons of sewage per acre per annum to meadow

land, and with cows taken indiscriminately at various periods after calving, an average of not less than 1,000 gallons of milk per acre might be expected; or more than this when cows are taken at their best, and the season and other circumstances are more than usually favourable.

In the case of the experiments with rye-grass much less sewage was applied than is above assumed, and the results relate to the experience of one season only, which was not only a comparatively favourable one for the action of sewage, but, being the first year of growth after sowing down, was also favourable so far as the condition of the crop was concerned. The indication is, however, that with Italian rye-grass a larger yield of milk per acre may be obtained, for the application of a given amount of sewage, than with meadow grass. But with Italian rye-grass the land has to be periodically broken up, during which time less sewage per acre, if any, can be utilized, and hence, for the distribution of a given amount of sewage, the expense of laying down a much larger area would be necessary so far as this crop were introduced. On the other hand, the advantage of the practice would be, that other crops, for which the direct application of sewage is less appropriate than to grass, would be intermediately grown, either relying upon the residue of sewage manuring remaining in the broken up land, or by means of the solid manure derived from the consumption of the sewaged grass. In either case, therefore, such produce would be obtained indirectly by means of sewage.

Bearing in mind the varying conditions of the several experiments, the differences which the Table shows in the estimated value of the milk yielded from the produce of each acre ostensibly receiving the same amount of sewage will be intelligible, and it will not be necessary to call attention to the figures in detail. The results taken as a whole lead to the conclusion that the gross money return per acre, reckoned in milk at 8*d.* per gallon, might be estimated at certainly not less than 30*l.* to 35*l.* with an application of about 5,000 tons of sewage per acre per annum.

No allowance can be made for the value of the increase in weight in the case of cows, for at the end of their milking period, even though some may gain in weight considerably, they are certainly, on the average, of less money value than at the beginning, so that a deduction rather than an addition should be made on the score of the difference in value of the animals themselves, at the end as compared with the beginning of their milking period.

The last four columns of Table VII. show the estimated yield of milk, and the value of the milk at 8*d.* per gallon, from the increased produce of 1,000 tons of sewage in the different experiments; and the estimates are given both inclusive and exclusive of oilcake (if any) as before referred to.

In 1861, when the sewage was not applied until the Spring, and less had therefore to be reckoned as contributing to the increase obtained, nearly 180 gallons of milk are estimated to be

obtained for each 1,000 tons of sewage, when the amount actually applied had not exceeded 3,000 tons, and the rate per annum not 5,000. Again, reckoned according to the yield of milk for a given amount of grass consumed during the first 12 weeks, or the most favourable half, of the season of 1863, the increased yield of milk for each 1,000 tons of sewage was 205¾ gallons with 3,000, 167 gallons with 6,000, and only 126¾ gallons with 9,000 tons of sewage per acre per annum. According to the results obtained with rye grass during the same 12 weeks of the season of 1863, the yield was even somewhat better than in the most favourable case with the meadow grass, and it is the better the larger the quantity of sewage, which, however, was not applied until the Spring, and, owing to deficiency of supply, little exceeded 1,500 tons per acre.

Owing to the very large produce without sewage in 1862, and to the unfavourable character of the season for the action of sewage, the increased yield of milk estimated as due to 1,000 tons of sewage, even with the addition of a considerable amount of oilcake, was very small; much smaller, indeed, than in the more favourable seasons without the oilcake. It was also smaller with oilcake during the latter half of the season of 1863, than without it during the former half, when the quality of the grass, and the condition of the cows, were both so much more favourable. Even taking the whole of the comparatively favourable season of 1863, half without and half with oilcake, but when winter supply of sewage had to be reckoned against the produce, the estimated increased yield of milk for each 1,000 tons of sewage applied was consideraly less than in 1861 without oilcake, but when no winter supply of sewage had to be reckoned against the yield.

With rye-grass, unlike the meadow grass, the yield of milk for a given amount of sewage was greater during the latter part of the season with oilcake, than during the earlier or more favourable part without it. As before observed, it would appear that rye-grass does not deteriorate so much as meadow grass as the season advances.

In 1861, when no winter supply of sewage had to be reckoned against the increase, and the grass was consumed without oilcake, the estimated value of the milk obtained for each 1,000 tons of sewage applied was between 5*l.* and 6*l.* In 1863, according to the yield of milk for a given amount of grass during the first half of the season, without oilcake, the value for each 1,000 tons of sewage was, with 3,000 tons more, but with 6,000 and 9,000 tons less, than in 1861; and, reckoned according to the yield during the latter half of the season, it was, even with oilcake, little more than half as much as according to that during the earlier half; and in the unfavourable season of 1862, also with oilcake, it was even less still. Taking the whole of the comparatively favourable season of 1863, half without and half with oilcake, the return for each 1,000 tons of sewage, reckoned in milk at 8*d.* per gallon, was rather over 5*l.* when only 3,000 tons were applied, one seventh less when 6,000 tons, and one third less when 9,000 tons were employed.

With the rye-grass the estimated money return, for a given amount of sewage applied, was considerably higher than with the meadow grass; but it must be borne in mind that there was no winter supply of sewage to reckon against the produce, and that the results relate both to the first and most productive year of the growth of the crop, and to a favourable season for the application of sewage.

Excepting in the cases of the rye grass, and of the meadow grass in 1861, in neither of which had there been any winter supply, there was a very marked diminution in the money return for a given amount of sewage where the largest quantities were applied. The practical question suggests itself — what is approximately the limit of maximum yield for a given amount of sewage which is attainable without so far increasing the area, and consequently the cost of distribution, as to more than counterbalance the increased return? Special reference will be made to this point further on. But it may be here observed that, so far as these results give the means of judging, it would appear that an average of about 5*l.* increased value of milk, reckoned at 8*d.* per gallon, may be anticipated from the application of each 1,000 tons of sewage when the amount applied does not exceed about 5,000 tons per acre, per annum. This would be equivalent to a *gross* value of increased produce of milk of rather more than 1*d.* for every ton of sewage applied.

V. *Composition of the Rugby Sewage Water.*

From the commencement of the Rugby experiments, samples of sewage have been collected for analysis at short intervals in each of the two fields. The plan was, to take about a quart from the gauge tank in the field, holding about 3¼ tons, at intervals of about two hours for as many days in the week as the sewage was applied; and at the end of the week, after well shaking the mixture, a one or two gallon sample was sent to Professor Way for analysis.

In 1861, twelve such samples from each field, representing the supply for the seven months of April to October inclusive, were taken and submitted to analysis.

The season of 1862 is reckoned to include the months from November 1861 to October 1862 inclusive. During each month from November 1861 to April 1862 inclusive only one sample was taken from each field, during May two, during June one, and during July, August, September, and October, two were taken; thus making a total of 17 samples from each field to represent the sewage supplied during the season.

In like manner the season of 1863 was reckoned to include the period from November 1862 to October 1863 inclusive. From November 1862 to March 1863 inclusive two samples of sewage were taken in each month in each field; in April one only in each field, and in May two in the 5-acre, and one only in the 10-acre field. From this date, namely, during June, July, August, September, and October, a different plan of collection

was adopted. During two weeks in each of these months (as a rule the first and third) a sample was taken every two hours from the gauge-tank in whichever field the sewage was being applied, and at the end of the week the samples from the two fields were well mixed, and a portion of the mixture sent off for analysis, as representing the sewage of that week, without distinction as to the field in which it was collected.

The results of each of the 24 analyses of the sewage representing the season ending October 1861 were given in the Appendix (and a summary of them was given in Table VI.) in the previous Report; those of the 34 for the season ending October 1862 are given in Tables XV. to XVII., and those of the 35 relating to the season of 1863 ending October 1863, in Tables XVIII. to XXI., pp. 163–169, in Appendix No. 1. in the present Report.

Leaving the details for reference it will be sufficient to give in this place the summary view of the composition of the sewage which Tables VIII. and IX. (pp. 29 and 30) present; in the former of which is given the average grains per gallon, and in the latter the average lbs. per 1,000 tons, of the different constituents, in the sewage from each field, in each of the three seasons, respectively.

TABLE VIII.—Average Composition of the Rugby Sewage, supplied in each Field, in 1861, 1862, and 1863

GRAINS PER GALLON.

CONSTITUENTS.		Season 1861; April to October.		Season 1862; November 1861 to October 1862.		Season 1863; November 1862 to October 1863.		General Means of			
		5-acre Field; 12 Samples.	10-acre Field; 12 Samples.	5-acre Field; 17 Samples.	10-acre Field; 17 Samples.	5-acre Field; 23 (1) Samples.	10-acre Field; 22 (2) Samples.	24 Samples; April to October 1861.	34 Samples; November 1861 to October 1862.	35 (3) Samples; November 1862 to October 1863.	93 Samples; April 1861 to October 1863.
Organic matter	In solution	10·26	10·30	8·42	7·98	8·35	8·29	10·28	8·20	7·92	8·63
	In suspension	16·75	11·57	16·71	16·96	27·35	25·99	14·16	16·84	24·03	18·85
	Total	27·01	21·87	25·13	24·94	35·70	34·28	24·44	25·04	31·95	27·48
Inorganic matter	In solution	36·82	35·85	35·00	33·88	39·57	38·77	36·34	34·42	36·80	35·81
	In suspension	16·18	12·55	21·31	20·42	39·41	34·93	14·36	20·86	34·45	24·30
	Total	53·00	48·40	56·31	54·25	78·98	73·70	50·70	55·28	71·25	60·11
Total in solution		47·08	46·15	43·42	41·81	47·92	47·06	46·62	42·62	44·72	44·44
Total in suspension		32·93	24·12	38·02	37·38	66·76	60·92	28·52	37·70	58·48	43·15
Total solid matter		80·01	70·27	81·44	79·19	114·68	107·98	75·14	80·32	103·20	87·59
Ammonia	In solution	4·99	4·98	4·45	4·51	5·83	5·69	4·98	4·48	5·22	4·89
	In suspension	1·65	1·18	1·45	1·48	2·08	1·98	1·41	1·47	1·86	1·60
	Total	6·64	6·16	5·90	5·99	7·91	7·67	6·39	5·95	7·08	6·49

(1) 13 Samples exclusively from the 5-acre Field, and 10 of mixtures from the 5-acre and the 10-acre Fields.
(2) 12 Samples exclusively from the 10-acre Field, and 10 of mixtures from the 5-acre and the 10-acre Fields.
(3) 13 Samples exclusively from the 5-acre Field, 12 from the 10-acre Field, and 10 of mixtures from the two fields.

TABLE IX.—Average Composition of the Rugby Sewage, supplied in each Field, in 1861, 1862, and 1863.

LBS. PER 1,000 TONS.

CONSTITUENTS.		Season 1861; April to October.		Season 1862; November 1861 to October 1862.		Season 1863; November 1861 to October 1863.		General Means of			
		5-acre Field; 12 Samples.	10-acre Field; 12 Samples.	5-acre Field; 17 Samples.	10-acre Field; 17 Samples.	5-acre Field; 23 (1) Samples.	10-acre Field; 22 (2) Samples.	24 Samples; April to October 1861.	34 Samples; November 1861 to October 1862.	35 (3) Samples; November 1862 to October 1863.	93 Samples; April 1861 to October 1863.
Organic matter	In solution	328·3	329·6	269·5	255·4	267·2	265·3	329·0	262·4	253·4	276·2
	In suspension	536·0	370·2	534·7	542·7	875·2	831·7	453·1	538·9	769·0	603·2
	Total	864·3	699·8	804·2	798·1	1142·4	1097·0	782·1	801·3	1022·4	879·4
Inorganic matter	In solution	1178·2	1147·2	1120·0	1082·6	1266·2	1240·6	1162·9	1101·4	1177·6	1145·9
	In suspension	517·8	401·6	681·9	653·4	1261·1	1117·8	459·5	667·5	1102·4	777·6
	Total	1696·0	1548·8	1801·9	1736·0	2527·3	2358·4	1622·4	1768·9	2280·0	1923·5
Total in solution		1506·5	1476·8	1389·5	1338·0	1533·4	1505·9	1491·9	1363·8	1431·0	1422·1
Total in suspension		1053·8	771·8	1216·6	1196·1	2136·3	1949·5	912·6	1206·4	1871·4	1380·8
Total solid matter		2560·3	2248·6	2606·1	2534·1	3669·7	3455·4	2404·5	2570·2	3302·4	2802·9
Ammonia	In solution	159·7	159·4	142·4	144·3	186·6	182·1	159·4	143·4	167·0	156·5
	In suspension	52·8	37·7	46·4	47·4	66·5	63·4	45·1	47·0	59·5	51·2
	Total	212·5	197·1	188·8	191·7	253·1	245·5	204·5	190·4	226·5	207·7

(1) 13 Samples exclusively from the 5-acre Field, and 10 of mixtures from the 5-acre and the 10-acre Fields.
(2) 12 Samples exclusively from the 10-acre Field, and 10 of mixtures from the 5-acre and the 10-acre Fields.
(3) 13 Samples exclusively from the 5-acre Field, 12 from the 10-acre Field, and 10 of mixtures from the two fields.

As the ammonia contributes about three fourths of the estimated money value of the constituents of town sewage, and as its amount is the best index to that of the associated constituents valuable as manure, and also to the relation of population to quantity of sewage, its proportion is of great importance to consider.

Tables VIII. and IX. show that, according to the mean of all the analyses for the entire season in each case, there was comparatively little difference in the amounts either of ammonia, or of total matters in solution, in the sewage from the two fields. The difference in the amounts of suspended matter was, however, more considerable.

Comparing the composition of the sewage of one season with that of another, as indicated by the mean result of all the analyses relating to each, it is seen that the amounts of ammonia, and total matter in solution, are less in the comparatively wet season of 1861–2, than in either of the others, whilst the ammonia is the highest in the dry season of 1862–3. As no samples were analysed during the winter of 1860–61 when the sewage was probably weaker than during the remaining portions of the season, it might be concluded that the mean of the analyses for 1861 would give too high an average composition; but, on the other hand, there were fewer analyses during the months of August, September, and October, when the sewage was comparatively strong, than during the five preceding months when it averaged much weaker, which, of course, would tend to reduce the mean. It is probable, therefore, that the mean of the analyses for 1861 gives a pretty fair indication of the composition of the sewage for that season. With regard to 1862, there were fewer analyses during the months when the sewage averaged the strongest, and hence, the mean of the results for that season probably indicate somewhat too low an average composition. Lastly, in the season of 1863, there were again fewer analyses relating to the periods when the sewage was strongest, and hence the mean of the results for that season also probably indicates somewhat too low a composition. There can be little doubt, however, that the sewage of the wet season of 1862 was the weakest, that of 1861 somewhat stronger, and that of the dry season of 1863 stronger still.

It is obvious that the variations in the composition of sewage must depend chiefly upon its state of dilution, and that the state of dilution must be very much influenced by the rainfall. An inspection of the Tables in the Appendix, above referred to, will show how extremely different was the composition at one time compared with another, notwithstanding the general agreement of the average results as between one field and the other, or between one season and another. The great variation in the composition according to circumstances is strikingly illustrated in the following Table X.; and it is the more remarkable when it is borne in mind that every sample analysed was a mixture of portions taken every few hours throughout the day for several days together:

Table X.—Showing the highest, lowest, and average Amounts of Ammonia, and total solid matter, in mixed Samples of Sewage, collected at different Periods in each of the three Seasons.

—	—	Ammonia.		Total solid matter.	
		Grains per Gallon.	lbs. per 1,000 Tons.	Grains per Gallon.	lbs. per 1,000 Tons.
1861	Highest - -	15·64	500·5	216·5	6928
	Lowest - -	2·99	95·7	37·6	1203
	Mean of 24 analyses	6·39	204·5	75·1	2405
1861–2	Highest - -	11·38	364·2	129·3	4138
	Lowest - -	2·55	81·6	50·5	1616
	Mean of 34 analyses	5·95	190·4	80·3	2570
1862–3	Highest - -	12·81	409·9	269·9	8637
	Lowest - -	3·14	100·5	62·2	1989
	Mean of 35 analyses	7·08	226·5	103·2	3302

Thus, the amount of ammonia, which to such a great extent rules the estimated money value of the sewage, varied at different times during the 31 months to which the samples refer, from about $2\frac{1}{2}$ to about $15\frac{1}{2}$ grains per gallon, or from $81\frac{1}{2}$ to $500\frac{1}{2}$ lbs. per 1,000 tons; and the total solid matter varied from about $37\frac{1}{2}$ to about 270 grains per gallon, or from 1,203 to 8,637 lbs. per 1,000 tons. It will be obvious from these results how valueless for the purposes of determining the average composition of the sewage of any locality—indeed, how utterly misleading—must be the analyses of samples taken without due regard to the circumstances by which its composition is so materially affected.

Although the sewage of 1862–3 was considerably richer in valuable constituents than that of the wetter season of 1861–2, yet the mean of the whole 93 analyses relating to the sewage of the three seasons indicates a composition closely agreeing, in all essential points, with that adopted in the previous report according to the results then obtained relating to the season of 1861 alone. For reasons explained above, however, the real average composition of the sewage of the period was probably somewhat higher than is indicated by the direct numerical mean of the 93 analyses. The latter gives—

	Grains per gallon.	Lbs. per 1,000 tons.
Total solid matter - -	87·6	2,803
Ammonia - - -	6·5	208

From a careful consideration of the circumstances alluded to it is concluded that the average sewage of the 31 months would more nearly contain as follows—

	Grains per gallon.	Lbs. per 1,000 tons.
Total solid matter - -	92·5	2,960
Ammonia - - -	7·0	224

Assuming this to represent the average composition of the Rugby sewage during the period in question, 1,000 tons may be estimated to contain nitrogen reckoned as ammonia equivalent to that con-

tributed in the mixed excrements, and associated matters, of between 17 and 18 persons of a mixed population of both sexes and all ages in a year, or to that in between 11 and 12 cwts. of Peruvian guano.* In other words, about 1,700 tons of such sewage would contain nitrogen reckoned as ammonia equal to that in 1 ton of Peruvian guano. Yet it has been seen that the increase of grass obtained by the use of 1,000 tons of this sewage did not, under the most favourable circumstances, exceed that which would correspond to about 26 cwts. of hay, and was on the average much less. To this question of the amount of produce obtained for a given amount of manurial constituents applied further reference will be made.

Before leaving the subject of the composition of the Rugby sewage, attention should be directed to one or two other points.

In Table XI. are given the results of the analyses of samples of sewage collected in each of the two fields, every two hours from 7 a.m. to 5 p.m., on April 16, 1861. It is seen that the amounts of both total solid matter and ammonia were the least in the samples collected early in the morning, the greatest during the middle of the day, and diminished towards the evening. As, however, the samples were not taken at the outfall as the sewage came from the town at the respective hours, but after it had been pumped from the main tank in which it was being collected and mixed throughout the day as it was produced, the variations in composition at the different periods are not so striking as have been observed when samples have been collected directly from the outfall at different periods of the day.

TABLE XI.

SHOWING the COMPOSITION of SAMPLES of the RUGBY SEWAGE collected at different hours of the day, on April 16, 1861.

—		Per Gallon.			
		Organic matter.	Inorganic matter.	Total solid matter.	Ammonia.
		Grains.	Grains.	Grains.	Grains.
7 A.M.	Five-acre Field - -	14·30	38·50	52·80	2·74
	Ten-acre Field - -	14·40	38·90	53·30	2·89
9 A.M.	Five-acre Field - -	20·50	39·80	60·30	4·71
	Ten-acre Field - -	20·20	47·20	67·40	3·51
11 A.M.	Five-acre Field - -	21·90	38·00	59·90	5·14
	Ten-acre Field - -	22·70	39·60	62·30	5·39
1 P.M.	Five-acre Field - -	20·10	36·40	56·50	4·82
	Ten-acre Field - -	25·20	41·60	66·80	5·74
3 P.M.	Five-acre Field - -	21·10	34·10	55·20	4·55
	Ten-acre Field - -	21·50	35·30	56·80	4·69
5 P.M.	Five-acre Field - -	22·00	35·80	57·80	4·32
	Ten-acre Field - -	20·30	37·50	57·80	4·37

* The rainfall of the period of the experiments, and, therefore, the dilution of the sewage, was, however, less than the average, according to which it is estimated that, with the present arrangements, 1,000 tons would represent the excretal matters of scarcely 17 average individuals, and the ammonia of scarcely 11 cwts. of Peruvian guano. (See pp. 44–45, and 76.)

Another point to which reference should be made is as to the amounts of phosphoric acid and potass in the sewage, and the relation of these to the ammonia (or nitrogen) associated with them; for it is obviously important to consider whether or not the mineral or incombustible constituents of sewage exist in it in sufficient proportion to the ammonia or nitrogen for the requirements of the crops to be grown; and as the phosphoric acid and potass (the one or the other or both according to circumstances) are, perhaps, the mineral constituents the most likely to be deficient relatively to the nitrogen, the proportion of them to the latter in the sewage, and in various crops, may appropriately be referred to in illustration of the point in question.

Table XII. shows the number of grains per gallon, of ammonia, phosphoric acid, and potass, and the relation of the phosphoric acid and the potass to one of nitrogen, in the few cases only in which the phosphoric acid and potass were determined in the Rugby sewage.

Table XII.

Particulars of the Samples.		Per Gallon.			Proportion to 1 Nitrogen.	
When collected.	Where collected.	Ammonia.	Phosphoric Acid.	Potass.	Phosphoric Acid.	Potass.
		Grains.	Grains.	Grains.		
April 1–6, 1861	Five-acre field	2·99	0·64	0·86	0·26	0·35
„ 1–6, „	Ten-acre field	4·69	0·70	0·61	0·18	0·16
„ 29,—May 4, 1861	Five-acre field	5·08	1·09	1·37	0·26	0·33
„ 29,— „ 4, „	Ten-acre field	5·64	1·28	1·29	0·28	0·28
Nov. 4–6, 1861	Five-acre field	10·91	2·14	4·95	0·24	0·55
„ 5, „	Ten-acre field	11·38	2·39	4·63	0·26	0·49
Dec. 17–18, „	Five-acre field	9·30	1·53	3·28	0·20	0·43
„ 17, „	Ten-acre field	7·67	1·15	3·40	0·18	0·54
July 6–11, 1864	Another field.	8·66	3·12	3·84	0·44	0·54
„ 13–18 „	Another field	8·78	2·80	3·90	0·39	0·54
	Average	7·51	1·68	2·81	0·27	0·42

It is seen that when the sewage was poor in ammonia it was also poor in phosphoric acid and potass, and when rich in ammonia rich in phosphoric acid and potass. In the case of neither constituent, however, is the relation to one of nitrogen the same in all the samples; though the correspondence is perhaps quite as close as could be expected when the circumstances which rule the amount of each are taken into consideration.

By far the larger proportion of the ammonia (or nitrogen) exists in solution in the sewage, so that if the sample taken did not contain its fair proportion of suspended or sedimentary matter, the amount of ammonia would not be very materially affected thereby. Of the phosphoric acid, on the other hand, a much larger proportion exists in the suspended matter, so that if the agitation in the main tank were incomplete, the pumps worked sluggishly, or the mixing in the gauge-tank in the field before taking the sample were insufficient, the proportion of suspended matter in the sample analysed might be too small, or under other conditions it might be too large. Hence, although the phosphoric acid must bear a pretty constant proportion to the nitrogen in sewage, if

great care be not taken in the sampling, analysis may show considerable variation in the amount, and in the proportion to the nitrogen, in samples taken at different times. It was, in fact, the case, that in the instances among those to which Table XII. refers in which the amount of phosphoric acid, and its proportion to the nitrogen, were the highest, there also was the largest amount of sedimentary matter in the sewage.

Again, the potass exists exclusively in the solution, so that if its proportion to the ammonia were constant in sewage, any deviation from the exactly due proportion of sedimentary matter in the sample taken would comparatively little affect the indications of analysis in regard to it. But whilst the phosphoric acid of sewage may be said to be derived exclusively from food-refuse and excretal matters, and therefore necessarily to bear within comparatively narrow limits a pretty uniform relation to the nitrogen, the amount of potass will vary very much according to locality, and be considerably greater where the streets or roads are constructed of potass minerals (as granite) than elsewhere.

According to the average result obtained upon the analysis of ten different samples of the Rugby sewage there were, as is shown in the bottom line of Table XII., 0·27 parts of phosphoric acid, and 0·42 parts of potass, to 1 of nitrogen in the sewage; or, in other words, for 100 of nitrogen in the sewage there were 27 parts of phosphoric acid, and 42 parts of potass. The question arises—what are the proportions of the phosphoric acid and potass to the nitrogen in different crops? These vary considerably for the same description of crop according to circumstances, but the figures given in the following Table (XIII.) may be taken to represent approximately the average proportions.

Table XIII.

—	Proportion to 1 Nitrogen.					
	Phosphoric Acid.			Potass.		
	In Corn, Roots, &c.	In Straw, Leaves, &c.	In Total Produce.	In Corn, Roots, &c.	In Straw, Leaves, &c.	In Total Produce.
Wheat	0·48	0·42	0·46	0·28	1·08	0·57
Barley	0·40	0·34	0·38	0·34	1·26	0·60
Oats	0·28	0·37	0·30	0·25	1·55	0·65
Meadow Hay	..	...	0·27	..	..	1·00
Clover Hay	..	..	0·23	..	..	0·52
Beans	0·25	0·46	0·30	0·32	1·23	0·50
Mangolds	0·17	..	..	1·00	..	..
Swedes	0·27	0·16	0·21	0·82	0·44	0·63
Common Turnips	0·28	0·18	0·26	1·60	0·71	1·17
Potatoes	0·42	..	..	1·23	..	..

Thus, according to this Table, meadow hay contains on the average 0·27 parts of phosphoric acid to 1 of nitrogen, and according to the average result obtained on the analysis of the ten samples of the Rugby sewage it contained exactly the same proportion. Of potass, on the other hand, whilst meadow hay contains 1 part, the sewage only contained 0·42 parts to 1 of nitrogen.

According to these figures, if on the application of sewage to meadow land the whole of the nitrogen supplied were recovered in the increase of produce, it is obvious that there would be associated with it in the manure almost exactly the amount of phosphoric acid, but less than half the amount of potass, required by the crop. But in practice considerably less nitrogen is recovered in the increase of crop than is supplied in the manure employed to produce it. Then, again, the dry or solid substance of sewaged grass, as it is generally cut, contains a considerably higher per-centage of nitrogen than that of ordinary meadow grass as cut for hay; whilst, from the results of direct experiments made on the point, it is probable that the proportion of phosphoric acid to 1 of nitrogen is somewhat lower, and that of potass somewhat higher, in sewaged grass than in ordinary meadow hay. It follows, that if the relation of the phosphoric acid and potass to the nitrogen in sewage be fairly represented by the average result of the few analyses given on the point, it would contain more phosphoric acid, though perhaps not so much potass as could be turned to the account of growth under the influence of the amount of nitrogen at the same time supplied.

Of phosphoric acid at any rate there would probably be an accumulation within the soil, rather than an exhaustion of it, by the use of sewage to grass land. Still, agricultural experience shows that an apparently excessive supply of phosphoric acid is frequently useful in giving a favourable development, or tendency of growth, to a plant; and in this way it is possible that the application of phosphatic manures in conjunction with sewage might be advantageous. As above stated, the proportion of the potass to the nitrogen in town sewage would vary considerably according to locality; and where there was no other source of it than food-refuse and the excretal matters of man and animals, it would be more likely than the phosphoric acid to be in relative defect in case of the constant application of the sewage to grass land.

In corn crops, such as wheat or barley, the proportion of phosphoric acid to nitrogen is much higher than in meadow hay, and much higher also than was found in the Rugby sewage. The average proportion in the sewage was, however, not deficient compared with that of the phosphoric acid in these crops to the amount of nitrogen which in common practice is required to be supplied in manure, to yield one of nitrogen in the form of increased produce. Of potass, the proportion to 1 of nitrogen in

these crops is, in the grain, which alone is generally sold off the farm, considerably less than was found on the average in the Rugby sewage. In fact, if town sewage were used on any comprehensive scale to corn crops grown in rotation, phosphoric acid would be more likely to become deficient than potass in the majority of soils; but if phosphatic manures were employed for other crops of the course, they would not need to be supplemented to the sewage for corn. It is, indeed, well known that phosphatic manures are in practice much more used, and are much more effective, for root than for corn crops, yet, as the Table shows, the proportion of phosphoric acid to 1 of nitrogen is lower in the root than in the corn crops.

Without further comments on the figures given in Tables XII. and XIII., it may be stated, in general terms, that a careful consideration of the subject leads to the conclusion that potass would be more likely than phosphoric acid to become deficient where town sewage was applied constantly to meadow land, whilst phosphoric acid would be more likely to become deficient than potass where it was applied to the ordinary crops of rotation.

VI. *Estimated Average Composition of the Metropolitan Sewage.*

It will be well to offer a few observations here on the evidence at command relating to the average composition of the Metropolitan sewage, and to the estimated money value, according to trade prices, of its manurial constituents.

In our former Report attention was called to the fact that, so far as it was then sampled and analysed, the Rugby sewage showed an average composition agreeing very closely with that calculated for the Metropolitan sewage, according to the analyses by Dr. Letheby of samples, taken at noon and midnight respectively, from 10 different sewers; and, as above stated, the further results now at command indicate pretty nearly the same average composition for the Rugby sewage as that formerly adopted. Thus, whilst calculated according to Dr. Letheby's analyses the Metropolitan sewage contained 6·66 grains of ammonia per gallon, the Rugby sewage was then estimated to contain 6·65 grains, and taking into the calculation all the results now obtained the direct mean of the 93 analyses gives 6·5 grains, and the calculated average about 7 grains.

The amount of ammonia will still, for convenience, be taken as the gauge of comparative value; not, of course, that other constituents are not equally important, but, as already referred to, as the amount of ammonia contributes a very large proportion of the money value as estimated according to composition, and is a pretty sure indication of the approximate value of the associated constituents, it comes to be a very safe index to the approximate value of the whole, and at the same time the discussion is much simplified.

Baron Liebig, adopting as his basis an analysis of Dorset Square sewage by Mr. Way, which showed nearly 18 grains of

ammonia per gallon, estimates the constituents in sewage of that composition to be worth $1\frac{1}{3}d.$ per ton, but that the value will be raised to about $4d.$ if to each ton be added $1\frac{1}{5}$ lb. of superphosphate of lime. But in his report Professor Way stated in reference to the analysis in question, together with another given at the same time, that although the results showed that there was great manurial value in sewage, yet they could not be taken as in any way affording a measure of that value; and he has since given it as his opinion that the sample of sewage, upon the analysis of which Baron Liebig relied, was undoubtedly very much stronger than the average of Metropolitan sewage. Indeed, Baron Liebig himself admitted that more certain data as to the average composition of sewage were wanting. He said, "In the calculation of the value of sewer water there is one factor doubtful, viz., the absolute amount of phosphoric acid, ammonia, and potass, which a ton of the said water contains." Moreover, his proposal to add a certain quantity of superphosphate of lime to the sewage has for its object to assimilate the proportion of phosphoric acid to the ammonia or nitrogen in the sewage to that found in Peruvian guano, which, of course, is a standard having no necessary connexion with the proportions required by soils or crops. For these reasons Baron Liebig's estimates are obviously irrelevant.*

In the Report of Messrs. Hofmann and Witt to the Main Drainage Referees, they record 8·21 grains of ammonia per gallon as the amount they found in a mixture of samples of sewage collected from the Savoy Street sewer every hour during 24 in dry weather; and the Referees had ascertained by gauging that the rate of flow from the sewers under such circumstances averaged as closely as could be expected that which would be due to water supply exclusive of rainfall. In fact, the Referees concluded that the mixed sample in question represented pretty closely the average normal sewage without rainfall of that sewer, and further, that the sewage from that sewer might be taken as fairly representing the Metropolitan sewage under the conditions stated.

With 8·21 grains of ammonia per gallon (and the associated matters), Messrs. Hofmann and Witt estimated the constituents in a ton of such sewage to be worth $2\frac{1}{10}d.$, and taking (in accordance with the information supplied to them by the Referees) the total amount of the Metropolitan sewage without rainfall at 95 million gallons a day, or about 158 million tons per annum, they estimated the total annual value of the constituents in the Metropolitan sewage to be 1,385,540*l.*

To control this estimate founded on the amount and composition of the sewage, Messrs. Hofmann and Witt calculated the value of the constituents annually voided in the forms of urine

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* In a recent letter, published some time after the above was in type, Baron Liebig adopts 7·2 instead of 18 grains, as the average amount of ammonia in a gallon of the Metropolitan Sewage, inclusive of rainfall, &c. It will be seen, by the sequel, that even after this very liberal amendment of his estimate of about a year and a half ago, he is doubtless still too high; and his estimate of value of constituents is so in a corresponding degree.

and fæces by the entire Metropolitan population, assuming it to number 2,600,000 persons. In this way they arrived at a value of 1,444,177*l.*, which they considered satisfactory confirmation of the estimate deduced from the quantity and composition of the sewage. But in their confirmatory estimate they adopt, for the composition and value of the liquid and solid voidings of each individual of a mixed population of both sexes and all ages, the amounts fixed for adult males,* assuming that other matters reaching the sewers would probably make up the difference. There can be little doubt that this was making far too liberal an allowance for the other matters than human voidings, which contribute to the value of the Metropolitan sewage.

The object of the Referees appears to have been to obtain an estimate of the total annual value of the sewage, and with such very great variations as occur in both the amount and composition of the sewage when mixed with different amounts of rainfall, it is obvious that the method they adopted of collecting for analysis samples of sewage as far as possible free from rainfall, and then calculating the composition and value of the estimated total amount of dry weather sewage according to the results of the analysis of such samples, was the only admissible one unless they had taken samples almost the year round. Their estimate of the value per ton of the dry weather sewage, or sewage without rainfall, was, in fact, only a step in the process of calculating the total annual value of the Metropolitan sewage, and they did not give any estimate of the value per ton in the average condition of dilution with rainfall in which it would have to be utilized.

It is variously estimated that the normal sewage, or sewage without rainfall, is on the average the year round mixed with from two thirds to an equal bulk of subsoil water and rain. Assuming it to be so diluted by an addition of two thirds to its own bulk, this, adopting Messrs. Hofmann and Witt's analysis and valuation for the sewage without rainfall, would reduce the average amount of ammonia in the total sewage with rainfall to 4·93 grains per gallon, and it would in like manner reduce the value from $2\frac{1}{10}d.$ for a ton of sewage without rainfall to $1\frac{1}{4}d.$ for a ton inclusive of rainfall.

It is obviously important to consider whether the sample of the Savoy Street sewage analysed by Messrs. Hofmann and Witt was more probably of above or below the average composition and value of the Metropolitan sewage without rainfall? Some judgment may be formed on this point by a careful consideration of the quantity and estimated value of the constituents contributed to the sewage by each individual of a mixed population of both sexes and all ages, taken in connexion with the amount of water through which the constituents are supposed to be on the average distributed.

According to the data of Messrs. Hofmann and Witt the amounts of total solid matter, and ammonia, and the value of

* Messrs. Hofmann and Witt even add something to the actual experimental results obtained with Hessian soldiers to adapt them, as they say, to "John Bull"!

the constituents, in the annual total voidings of an adult male are as follows:—

	Adult males, per head per annum.			
	Total solid matter.	Ammonia.	Value.	
	lbs.	lbs.	s.	d.
Urine - -	61	15·8	10	0½
Fæces -	34	2·3	1	8¾
Total -	95	18·1	11	9¼

Dr. Thudichum, whose estimate is more recent, and whose experimental data on the point are much more comprehensive than those relied upon by Messrs. Hofmann and Witt, gives for the urine alone of adult males the following:—

	Adult males, per head per annum.			
	Total solid matter.	Ammonia.	Value.	
	lbs.	lbs.	s.	d.
Urine alone -	47	15·9	10	3½

It will be observed that so far as the important items of ammonia and value are concerned, the estimates of Messrs. Hofmann and Witt for the urine of an adult male agree very closely with those of Dr. Thudichum, founded on much more comprehensive analytical data. Dr. Thudichum does not, however, give any estimate of the amount, composition, and value of the fæces. With regard to the urine, he considers that the voidings of 2,800,000 persons of a mixed population of both sexes and all ages, may be taken as equivalent to those of 2,000,000 adult males. If, therefore, we take the mean of the estimates of Dr. Thudichum and Messrs. Hofmann and Witt with regard to the urine, and those of Messrs. Hofmann and Witt with regard to the fæces, of an adult male, and reduce both in the proportion of from 2·8 to 2 according to Dr. Thudichum's basis of calculation, we shall, provided the estimates of the two authorities be correct, arrive at amounts approximately applicable to an average individual of a mixed population of both sexes and all ages. The following results are so obtained:—

	Average of both sexes and all ages, per head per annum.		
	Ammonia.	Value.	
	lbs.	s.	d.
Urine - -	11·32	7	3
Fæces - -	1·64	1	2¾
Total -	12·96	8	5¾

Here then, founded upon the estimates of these authorities, we have nearly 13 lbs. of ammonia and nearly 8*s.* 6*d.* of value, to represent the annual mixed voidings of an average individual of a mixed population of both sexes and all ages. In our last Report 10 lbs. of ammonia only (and the value would

be less in a corresponding degree) were taken to represent the mixed excrements of an average individual. This was the estimate of Messrs. Lawes and Gilbert, founded on very comprehensive data, relating both to the amounts of constituents consumed in the food, and voided in the urine and fæces, of persons of different ages and both sexes. But as this estimate was made nearly 10 years ago, since which time much more evidence has been published relating to the amount and composition of human excremental matters, it has been thought desirable to collate, for the purposes of this Report, as far as possible the whole of the information at command up to the present time bearing upon these points.* The result of very much labour expended in this way indicates 12·6 lbs. of ammonia as the amount annually yielded by each average individual, when the calculation is based upon determinations or estimates of the amounts of nitrogen or ammonia-yielding matters voided by persons of different sexes and ages. But when the estimate is founded upon the recorded amounts of fresh urine and fæces voided by individuals of the different classes, and upon the average composition of urine and fæces respectively, the amount of ammonia indicated as the average per head, per annum, is 12·7.

It is admitted, however, by authorities on the subject, that the experimental data relating to males other than in the prime of life, and especially to females of all ages, are as yet inadequate for the basis of really trustworthy average estimates. Indeed, a careful consideration of the circumstances of the majority of the cases contributing to the averages among those divisions of the population in relation to which the evidence is the most plentiful, and of the relative character of the results where it is the most deficient, leads to the conclusion that the estimate of 12·6 lbs. of ammonia per head per annum, arrived at as above described, is in all probability too high.

Then, again, even assuming the approximate correctness of the estimates of Messrs. Hofmann and Witt and Dr. Thudichum of the amount of ammonia yielded by the urine of an average adult male (and those of Dr. Thudichum are based upon a considerable portion of the same data as the estimate of 12·6 given above), it is difficult to suppose that the urine of two such adults should be equalled by so small a proportion as 2·8 persons of a mixed population of both sexes and all ages; and hence we think that the estimate of nearly 13 lbs. of ammonia as deduced from their joint data regarding adult males, and Dr. Thudichum's measure of reduction, also involves elements of error on the side of excess.

* For nearly the whole, if not the whole, of the data upon which the new estimates are based, *see* "On the Sewage of London," by J. B. Lawes, F.R.S., Journal of the Society of Arts, March 9, 1855; "The Composition of the Urine in Health and Disease," by E. A. Parkes, M.D., 1860; "On an improved Mode of collecting Excrementitious Matter, with a view to its Application to the Benefit of Agriculture, &c.," by J. L. W. Thudichum, M D., F.C.S., Journal of the Society of Arts, May 15. 1863; and "On the Elimination of Urea and Urinary Water, in relation to the Period of the Day, Season, Exertion, Food, &c. &c.," by Edward Smith, M.D., LL.B., F.R.S., Philosophical Transactions, Vol. CLI., p. 747.

Lastly, the estimate of Messrs. Lawes and Gilbert of the amount of nitrogen in the food of an average individual, which was founded upon the calculation of 86 different dietaries arranged in 15 classes, according to sex, age, activity of mode of life, and other circumstances, showed an amount equivalent to rather less than 12·2 lbs. of ammonia, from which, of course, a deduction has to be made for the nitrogen retained in the body, and for loss in various ways.

Upon the whole, therefore, it is concluded that the amount of ammonia contributed to the sewer-water by each individual of a mixed population of both sexes and all ages, is pretty certainly more than 10 lbs. per annum as formerly assumed, but probably less than 12 lbs.

But it is not the human excretal matters of the resident population that alone contribute to the value of the sewage of the Metropolitan area. To these must be added those contributed by the population daily visiting the Metropolis from beyond its own limits (less the amount from those daily leaving it), the fractional part of the excretal matters of horses, cows, dogs, and other animals, of the refuse from slaughter-houses, of soot, and of the matters derived from the abrasion of the streets, which does not reach the land as stable dung, street sweepings, or in some other form, and also the refuse matters from certain manufacturing processes. It is very difficult to estimate the amount and value of the constituents reaching the sewers from these sources. They are doubtless large in the aggregate; but a little reflection leads to the conclusion that they are very small per head of the population, and that they must bear a very small proportion to those of the human excretal matters of the resident population. Indeed, so far as existing information bears upon the point, it would appear probable that not more than $12\frac{1}{2}$ lbs. of ammonia are contributed annually to the sewers from all sources, per head, of the population. This, including the associated matters, would, according to trade prices, represent a value of 8*s.* 4*d.* per annum for the manurial constituents of the sewage for each average individual of the population.

The question arises—through how much water are these $12\frac{1}{2}$ lbs. of ammonia (with the associated constituents), or, reckoned in value, through how much is this 8*s.* 4*d.* or 100 pence worth of manurial matter on the average distributed?

The dry weather sewage, or sewage without rainfall, of the Metropolis is variously estimated at from 5 to 7 cubic feet per head per day, equal respectively $31\frac{1}{6}$ and $43\frac{1}{2}$ gallons per head per day, or $50\frac{3}{4}$ and 71 tons per head per annum. According to the information furnished by the Referees to Messrs. Hofmann and Witt, it averaged about half way between these two extremes, namely, about $36\frac{1}{2}$ gallons per head per day, equal about 59 tons per head per annum. We shall therefore probably be not far wrong if we take 60 tons per head per annum as the average amount of the normal or dry weather sewage. It is further variously estimated that by subsoil water and rainfall the bulk

of the fluid will be increased by from two thirds to an equal volume.* Adopting the lower of these suppositions, which if too low will allow something for the occasional escape of storm-water, we have the 100 pence worth of constituents distributed through 100 tons of fluid, giving to it a value of one penny per ton according to the estimated market value of its manurial constituents.

What the real average dilution of the sewage the year round is, or will be, will doubtless be more certainly ascertained before long, when the main drainage system is completed, and the works have been a sufficient time in operation to render the gaugings safely available for the purposes of average estimates. In the meantime the following Table will be useful, showing the grains of ammonia per gallon, and the estimated value of the constituents per ton of sewage, on the assumption that the amount of ammonia contributed to the sewage from all sources will be at the rate of 12½ lbs. per head per annum of the population, and on the alternative assumptions, that the amount of fluid will be 60, 70, 80, 90, and 100 tons per head per annum. For comparison with these estimates there are given those of Messrs. Hofmann and Witt, according to their direct analysis of the dry weather sewage, and also the calculated amounts according to their analysis, supposing a dilution of 100 tons per head per annum with subsoil water and rainfall, instead of 60 tons without them, which their mixed sample of the Savoy Street sewer was supposed to represent.

TABLE XI.—Grains of Ammonia per Gallon, and estimated Value of the constituents in one ton, of Sewage at different dilutions, supposing 12½ lbs. of ammonia per head per annum, from all sources.

——	Ammonia per Gallon.	Estimated Value per Ton.
	Grains.	*d.*
If 60 tons of fluid per head per annum - - -	6·51	1·67
70 " " " - - -	5·58	1·43
80 " " " - - -	4·88	1·25
90 " " " - ..	4·34	1·11
100 " " " - - -	3·91	1·00
Hofmann and Witt—mixed sample of dry weather sewage from Savoy Street sewer - - -	8·21	2·11
The same if diluted with two-thirds its volume of subsoil water and rain-fall - - - -	4·93	1·27

Thus, assuming the amount of ammonia contributed to the sewage from all sources to be 12½ lbs. per head of the population, per annum, the dry weather sewage reckoned at 60 tons per head per annum would contain 6½ grains of ammonia per gallon; and, according to the currently adopted modes of computation, taking dry and portable manures as the standard, the total manurial

* Mr. Bazalgette informs us that the quantities of subsoil water and rainfall are too variable and irregular to enable him to give us any average.

constituents in one ton of such sewage will be worth $1\frac{2}{3}$ penny. Or, reckoning the average sewage, including subsoil water and rainfall, at 100 tons per head per annum, it will contain scarcely 4 grains of ammonia per gallon, and the manurial constituents in one ton of it will be worth just one penny.

If the above estimates for the dry weather sewage be correct, it is obvious that the sample analysed by Messrs. Hofmann and Witt was about one fourth stronger than the average Metropolitan sewage without rainfall. Their sample was, indeed, collected in a manner which gives it a better claim to the character of an average sample than any other of which the circumstances of collection, and the composition as determined by analysis, have hitherto been recorded. Still, it cannot be surprising to find that their results are probably in error to the extent above stated, when it is borne in mind that their sample was taken during 24 hours only, from one sewer only, and from one contributed to by a much more dense population than the average of equal areas in the Metropolitan district.

The approximate correctness of the above estimates of the average composition of the Metropolitan sewage, founded upon a consideration of the amount of manurial matters contributing to it and the amount of water through which they are distributed, is confirmed in a very striking and satisfactory manner by the fact, that the average amount of ammonia in the Rugby sewage, as deduced from the results of the direct analysis of 93 samples, representing the flow of 31 months, is almost exactly that arrived at by calculation, based upon a knowledge of the amount of population, and the average amount of water contributing to the sewage, and upon the assumption that $12\frac{1}{2}$ lbs. of ammonia will be contributed to it per head per annum. Thus, based upon the actual water supply over the three years 1859, 1860 and 1861, and upon the average rainfall over the seven years from 1855–1861 inclusive, it is estimated that there is at Rugby an average of about 60 tons of sewage per head per annum; and as Table XI. shows, if $12\frac{1}{2}$ lbs. of ammonia be distributed through that amount of fluid it will contain $6\frac{1}{2}$ grains of ammonia per gallon, and will have a value, calculated according to the trade prices of its manurial constituents, of $1\frac{2}{3}$ penny per ton. But the 31 months, to the sewage of which the analyses refer, were drier than usual, and hence the average amount of ammonia per gallon amounted to 7 grains, which, still reckoning $12\frac{1}{2}$ lbs. of ammonia per head per annum, is equivalent to only $55\frac{3}{4}$ tons of fluid per head per annum, which is probably more nearly the amount than 60 tons for the comparatively dry period.

Assuming the sewage of Rugby to amount to 60 tons, and that of the Metropolis to 100 tons per head per annum, including subsoil water and rainfall, it results that the latter will have less than two thirds the strength and value of the former. In fact, whilst 1,000 tons of the average sewage of Rugby would represent between 16 and 17 individuals of a mixed population of both sexes and all ages, the same quantity of that of

the Metropolis would represent only about 10 such individuals; and whilst, reckoned according to the amount of constituents they respectively contain, a ton of the average Rugby sewage would be worth 1⅔ penny, a ton of the Metropolitan sewage would be worth only 1 penny.

It may safely be affirmed that there is, as yet, no record of the analysis of any sample of sewage the circumstances of the collection of which justify the assumption that it fairly represents the average Metropolitan sewage, either with or without subsoil water and rainfall. Compared with any analytical results hitherto published, there can be little doubt that those arrived at by the synthetic method above described are much more trustworthy. It is to be hoped, however, that when the main drainage system comes to be in full operation, competent persons will be appointed to superintend the gauging, sampling, and analysis, with a view to providing data which may serve to determine satisfactorily the approximate average composition of the Metropolitan sewage as it will have to be dealt with in any plan of utilization.

For the convenience of those interested in estimates of the composition and value of town sewage, it may be mentioned that if a value of 8*d.* be put upon every lb. of ammonia, or if for each grain of ammonia per gallon a value of one farthing per ton be given to the sewage, the result will in either case agree almost exactly with that obtained by the elaborate method of giving the currently adopted market values to the several constituents, taking dry and portable manures as the standard.

The subject of the value realized, or realizable, by the agricultural utilisation of sewage in various ways is, of course, quite distinct from that of the estimated money value, according to the trade prices of the constituents, and is considered in other Sections of the Report.

VII. *Composition of the Drainage Water* (*Rugby*).

It is obvious that in attempting to determine experimentally the effects of applying to the land given amounts of sewage of known composition, there are other data essential to a right judgment of the results than those provided in the records of the increased amounts of produce yielded. It is necessary to consider,—

1. To what extent the sewage is deprived of its manurial or putrescible constituents in its passage over and through the land?
2. Whether the sewaged land is left in a higher or a lower condition after the removal of the crop?

To gain some information in reference to the second of these points it was decided that during the season of 1864 the produce of each plot should be carefully weighed, sampled, and analysed, without any further application of sewage, and that the soil of each plot should be submitted to such chemical examination as time and other circumstances would permit. The results of this part

of the inquiry are recorded in Section XII., p. 62, et seq. It may, however, be here observed, in passing, that barley (unmanured) was grown upon the three plots devoted to the experiments on the application of sewage to rye-grass in 1863, and that the crop, during growth, was obviously heavier where sewage had been applied than where it had not, and heavier also where the larger than where the smaller quantity was employed.

In order to determine how far the sewage-water was deprived of its manurial, or putrescible, constituents in its passage over and through the land, samples of the drainage water were collected simultaneously with those of the sewage in each field (commencing May 1862 and ending October 1863), and sent to Professor Way for analysis. In all 62 analyses of drainage water (or rather partial analyses corresponding in detail with those of the sewage) have thus been made. A few other special analyses, in much more detail, have been made of the sewage and drainage of the season of 1864.

The detailed results of the 62 analyses above referred to will be found in Tables XXII.–XXVII., pp. 170–175, in the Appendix. The following Table XV. gives a summary of the results, showing, in parallel columns, the average composition of the sewage and the drainage water, the first division referring to the samples collected during the months of May to October inclusive, 1862, and the second to those obtained from November 1862 to October 1863, both inclusive.

TABLE XV.—Average Composition of the Sewage and Drainage Water collected at Rugby in the Seasons of 1862 and 1863.

Grains per Gallon.

—	Five-acre Field.		Ten-acre Field.		The Two Fields.	
	Sewage water.	Drainage water.	Sewage water.	Drainage water.	Sewage water.	Drainage water.
Season 1862.—May to October, both inclusive.						
Substances in Solution: Organic	7·83	7·18	7·60	7·83	7·71	7·56
Substances in Solution: Inorganic	34·49	34·50	32·38	37·10	33·44	36·01
Substances in Solution: Total	42·32	41·68	39·98	44·93	41·15	43·57
Substances in Suspension: Organic	14·69	1·40	17·14	1·39	15·92	1·39
Substances in Suspension: Inorganic	25·67	1·81	24·89	3·74	25·28	2·92
Substances in Suspension: Total	40·36	3·21	42·03	5·13	41·20	4·81
Total organic matter	22·52	8·58	24·74	9·22	23·63	8·95
Total inorganic matter	60·16	36·31	57·27	40·84	58·72	38·93
Total solid matter	82·68	44·89	82·01	50·06	82·35	47·88
Ammonia: In solution	4·13	0·80	4·26	1·85	4·20	1·41
Ammonia: In suspension	1·37	0·24	1·52	0·33	1·44	0·29
Ammonia: Total	5·50	1·04	5·78	2·18	5·64	1·70

		Five-acre Field.		Ten-acre Field.		The Two Fields.	
		Sewage water.	Drainage water.	Sewage water.	Drainage water.	Sewage water.	Drainage water.
Season 1863.—November 1862 to October 1863, both inclusive.							
Substances in solution	Organic	8·35	7·46	8·30	7·98	8·32	7·73
	Inorganic	39·57	38·55	38·77	41·35	39·18	39·98
	Total	47·92	46·01	47·07	49·33	47·50	47·71
Substances in suspension	Organic	27·35	1·41	25·99	3·29	26·69	2·37
	Inorganic	39·41	2·14	34·93	3·93	37·22	3·06
	Total	66·76	3·55	60·92	7·22	63·91	5·43
Total organic matter		35·70	8·87	34·29	11·27	35·01	10·10
Total inorganic matter		78·98	40·69	73·70	45·28	76·40	43·04
Total solid matter		114·68	49·56	107·99	56·55	111·41	53·14
Ammonia	In solution	5·83	0·69	5·69	1·85	5·76	1·28
	In suspension	2·08	0·15	1·98	0·31	2·03	0·23
	Total	7·91	0·84	7·67	2·16	7·79	1·51

It is seen that of the matter in suspension nearly the whole, both organic and inorganic, has been separated from the sewage in its passage over and through the land; the drainage water containing but little of either, and probably a considerable part of that which it did contain was not contributed by the sewage, but was derived from the soil itself.

Of matter in solution, on the other hand, a gallon of drainage water contained sometimes more and sometimes less, but on the average much about the same amount both organic and inorganic as a gallon of the sewage. Here, again, there can be little doubt that a considerable portion of the matters found in the drainage water had their source in the soil itself—that there had, in fact, been an interchange; the sewage giving up to the soil valuable manurial constituents, and the fluid in its turn taking up substances from the soil for which the latter had less power of retention.

The character of the interchange of matters in solution as the sewage passed through the soil will be better understood on an inspection of Table XVI. (overleaf); but before referring to its details attention should be directed to one or two other points brought to light in Table XV.

As might be expected there was a larger portion of almost every constituent, or class of the constituents, enumerated, in the drainage from the high ridged and steeply sloping 10-acre field, over and through which the fluid passed the more rapidly, than in that from the almost level 5-acre field. This result is not only the most remarkable in degree, but the most important to remark, in the case of the ammonia. Thus, whilst a gallon of the drainage water from the 5-acre field contained, in 1862 only from one fifth to one sixth, and in 1863 little more than one tenth as much ammonia

as a gallon of the sewage, a gallon of the drainage from the 10-acre field contained, in 1862 more than one third, and in 1863 more than one fourth as much as an equal volume of the sewage. It is obvious, therefore, that the retention by the soil of the valuable manurial matters of the sewage was much less perfect in the case of the high ridged and steeply sloping 10-acre than in that of the flatter 5-acre field.

As above referred to, Table XVI., which now follows, shows more in detail the changes in the composition of the fluid in its passage through the soil.

TABLE XVI.—Detailed Composition of Samples of Sewage and Drainage Water collected at Rugby in the Summer of 1864.

Constituents.		Grains per Gallon.			
		Collected July 6–11.		Collected July 13–18.	
		Sewage.	Drainage.	Sewage.	Drainage.
In solution	Inorganic matter :—				
	Oxide of Iron, &c.	Traces.	—	1·25	0·25
	Lime	8·45	10·25	8·23	10·08
	Magnesia	1·76	1·69	1·80	1·69
	Soda (1)	5·46	0·38	5·24	2·30
	Chloride of Sodium (1)	6·82	9·73	8·53	9·21
	Chloride of Potassium (1)	6·08	1·50	6·17	2·34
	Sulphuric acid	4·39	6·55	4·01	6·75
	Phosphoric acid	1·28	0·44	1·66	0·32
	Carbonic acid	8·83	6·18	7·42	7·01
	Silica	1·80	0·80	1·00	0·80
	Total	44·87	37·52	45·31	40·75
	Organic matter	11·20	7·80	10·00	7·05
	Total matter in solution	56·07	45·32	55·31	47·80
In suspension	Inorganic matter :—				
	Oxide of Iron and Alumina	4·57	..	6·30	..
	Lime	4·48	..	3·75	..
	Magnesia	0·65	..	0·25	..
	Carbonic acid	3·25	..	2·17	..
	Phosphoric acid	1·84	..	1·14	..
	Silica, sand, &c.	31·60	..	39·30	..
	Total	46·39	..	52·91	..
	Organic matter	40·40	..	32·40	..
	Total matter in suspension	86·79	..	85·31	..
	Total inorganic matter	91·26	37·52	98·22	40·75
	Total organic matter (2)	51·60	7·80	42·40	7·05
	Total solid matter	142·86	45·32	140·62	47·80
(1) Containing	Potass	3·84	0·94	3·90	1·48
	Soda	9·07	5·54	9·76	7·17
	Chlorine	7·03	6·61	8·10	6·70
(2) Containing	Ammonia — In solution	5·74	0·98	6·36	0·92
	Ammonia — In suspension	2·92	..	2·42	..
	Ammonia — Total	8·66	0·98	8·78	0·92
	Nitric acid in solution = Ammonia	..	(3) 1·33	..	(4) 1·41

(3) 4·227 Nitric acid = 1·096 Nitrogen = 1·331 Ammonia.
(4) 4·483 „ „ = 1·162 „ = 1·411 „

The samples of sewage and drainage to which Table XVI. refers were not collected in either of the fields formerly under experiment, but in a meadow in the occupation of Mr. Campbell, where sewage had been pretty liberally applied for the last two or three seasons, but in which the application had been suspended for some weeks until within a few days of commencing to take the samples. The plan of collection, both for sewage and drainage, was, to take of the former about a gallon, and of the latter about half a gallon, 8 or 10 times during the 10 or 12 working hours of the day; at the end of the day after well shaking to take a gallon from each mixture, and to repeat this for six consecutive days until six gallons of each was obtained; when, from each, after well shaking, a two gallon sample was taken, and sent to Professor Way for analysis. The sewage flowed from the main into open runs for distribution over the land, but for the purpose of collecting the samples, the stand pipe was each time affixed, and the water allowed to flow through it for ten minutes before the sample was taken. The drainage was taken direct from the main cross pipe drain at the lower end of the field. Both sewage and drainage were allowed to run an hour or two each morning before taking the first sample.

During, and for sometime previous to, the collection of these samples, the weather was unusally dry, and the land was itself so dry, and in many places cracked, that it was feared a good deal of the sewage would find its way too directly to the drains. Judging from the results, however, which show a less amount of matter in solution (both organic and inorganic) in a gallon of drainage in proportion to that in an equal volume of sewage than in the average of the cases relating to the other fields and previous seasons, it would appear that the soil had done its work of absorption at any rate as well in the cases to which the more detailed analysis refer as in the majority of the others. It would, obviously, be desirable to have samples taken for analysis under very different conditions of the weather and of the land; and the plan was, to have such samples taken and analysed; but up to the time of writing the drought has continued, and it is doubtful whether results relating to wetter weather can be available for embodiment in the present report.

In judging of the results of either Table XV. or XVI., it will of course be borne in mind, that the quantity of any constituent in a gallon of the drainage water compared with that in a gallon of the sewage, by no means directly indicates the proportion supplied by the latter which has not been taken up by the soil. We had not the means of gauging the amount of fluid passing off as drainage water; but excepting when the land is already saturated, it must obviously be considerably less than that passed on to it as sewage. In fact, a gallon of drainage water will represent much more than a gallon of sewage, and hence the amount of any consituent of the sewage found in a gallon of the drainage must have been derived from more than a gallon of the former. The non-retention of valuable manurial matters by the soil was, therefore,

not so great as would at first sight appear from an inspection of the comparative composition of equal volumes of sewage and of drainage water.

It is satisfactory to observe that, of the inorganic matters in solution in the sewage, by far the larger proportion of those constituents which, by the removal of the produce from the land, are the most likely to become deficient relatively to others, is retained by the soil. Thus, smaller proportions of both the potass and the phosphoric acid coming on to the land in the sewage passed off in the drainage than of any other constituents. Of the bases, soda was also retained by the soil to a considerable extent, magnesia in a less degree, and lime less still. Indeed, of lime, there was more in a gallon of drainage than in a gallon of sewage. Of sulphuric acid, again, there was considerably more in the drainage than in an equal volume of the sewage. Lastly, of soluble silica a considerable portion passed off in the drainage.

Of inorganic matter in suspension, the quantity in the drainage water was so small, and it was so obviously derived from the soil, that it was considered quite unnecessary to submit it to analysis. It may be concluded, indeed, that practically the whole of the suspended matter of the sewage, both inorganic and organic, would be retained by the soil. It will be observed that a considerable proportion of the phosphoric acid of the sewage was in the suspended matter; and as there was none in that of the drainage, a much larger proportion of the total amount of that constituent of the sewage was retained by the soil than appears from the figures relating to the phosphoric acid in solution alone.

Of organic matter in solution a very considerable quantity was found in the drainage water; though, compared with the amount in the sewage, not quite so much in the two cases to which Table XVI. refers as on the average of the large number of cases to which Table XV. relates. There can be little doubt, however, that the soluble organic matter of the drainage was very different in character to that in the sewage. That set down as soluble organic matter in the sewage contained a very much larger proportion of nitrogen as ammonia, or ammonia-yielding matter, than that in the drainage. It is probable too, that, during periods of active vegetation, a notable portion of the soluble organic matter of drainage will frequently be derived from vegetable matter within the soil, and not directly from the sewage.

An important point to remark, which the more detailed analyses recorded in Table XVI. discloses, is, that whilst the sewage did not contain an appreciable amount of nitric acid, the drainage contained more nitrogen in that form than as ammonia; and adding the amount of ammonia to which the nitrogen in the nitric acid is equivalent to that determined as such, it would appear that the soil had not retained so large a proportion of that important manurial constituent of the sewage as might have been judged if only the more partial analyses, the average results of which are recorded in Table XV., had been made.

The amounts of potass, phosphoric acid, ammonia, and nitric acid, found in the drainage water, clearly show that the sewage was not perfectly deprived of its valuable manurial matters in its passage through the soil; and the amounts of total soluble matter, and especially of soluble organic matter, show that it was by no means perfectly purified. There is, indeed, a limit, depending upon the physical and chemical characters of the soil, and upon the amount and composition of the fluid passed through it, to the power which a soil possesses of removing substances from solution, or of preventing those already absorbed from being dissolved, in water passing through it; and so far as the soluble organic matters of the drainage are derived from vegetable matter within the soil, it is a question whether there will not always be a considerable amount in that passing from land covered with a luxuriant vegetation. So far, however, as the nitrogen of the drainage exists in the form of nitric acid, it is a pretty satisfactory indication that the organic matter has to a great extent already passed the stage of deleterious putrescence.

In the experiments under consideration the arrangements were not such as to allow of the water drained from one portion of the land being passed over another, otherwise it would no doubt have been more completely both utilized and purified. At Beddington, near Croydon, where a tract of about 250 acres is already laid down for sewage irrigation by gravitation and open runs (and the area is in course of enlargement), a great portion of the water does duty twice, and sometimes three times; and from the results of some analyses of the sewage and of the drainage water, which have kindly been communicated by Mr. Latham, the Engineer to the Croydon Local Board of Health, it appears (see Appendix, No. 3, p. 203.) that the water eventually passes from the land in a state of much greater purity than was the case in the Rugby experiments. In fact, before the present arrangements were in force, the Croydon Board had to meet numerous law suits on account of the pollution of the river by the sewage; but so efficiently is the sewage now purified that those having the right of fishing in the river have found it worth while to fix gratings to prevent the fish going up the main outfall from the sewage irrigated land.

It is clear that in any extensive scheme for the irrigation of grass land by sewage, the arrangements should be such as to allow of the water being passed over or through the land more than once, so that both the utilisation and the purification may be as complete as possible.

VIII. *Composition of the Unsewaged and Sewaged Grass.*

It has been seen that, reckoned in the fresh or green state, a greater weight of sewaged than unsewaged grass, was required to yield a given amount of milk or increase in live

weight; but that less of the dry or solid substance of the sewaged than of the unsewaged grass was required to produce a given amount of milk or increase. It was further found that, especially in the case of the sewaged grass, it required less, both of green grass and of dry substance of grass, to yield a given return in milk during the earlier than the later portions of the season, and also less in one season than in another. It is obviously important, therefore, to ascertain the difference in the proportion of dry or solid substance, and the difference in the composition of the solid substance itself, of the grass grown without and with sewage, with smaller and with larger quantities of sewage, at different periods of the season, and in different seasons.

The mode of taking and preparing samples for analysis was sufficiently described in our former Report; and the general results of the analyses of the produce of the first season (1861) were also there discussed; the details being given in Tables XXXIX., XLV., in the Appendix to that Report.

The detailed results of the analysis of the produce of 1862 and 1863 are given in Tables XXVIII.–XL., pp. 176–193, in Appendix No. 1. to the present Report; but the following summary Tables XVII. and XVIII. bring together, side by side, the mean results, both as to proportion of dry substance and composition of dry substance, for each of the three seasons over which the experiments have been conducted, and these will be sufficient to indicate the chief points of interest.

The general indications of the further results now adduced are strictly accordant with those formerly reported; the only new point illustrated being the difference in the composition of the grass in one season compared with another.

Comparing first the composition of the grass produced under different conditions, in one and the same season, it is seen that there is in each season a very great difference, both in the proportion of the dry substance and in the composition of that dry substance, according to the varying circumstances of growth. With scarcely an exception in either season, the proportion of dry or solid substance in the grass as cut, weighed, and given to the animals, was considerably lower in the sewaged than in the unsewaged grass, and generally the lower the larger the quantity of sewage employed. There was also, pretty uniformly, a diminished proportion of dry substance in each successive cutting as the season advanced.

It will be readily understood that the proportion of dry or solid substance in the grass depends upon the stage of growth, the proportion of leaf and stem, and the condition of the weather at the time of cutting. The grass grown without sewage was for the most part cut at a later stage of growth, and showed more tendency to form stem and seed than that grown with it, and the greater the quantity of sewage the greater was the production

TABLE XVII.—Per-centages of Dry Substance in the Unsewaged and the Sewaged Grass.

SEASONS 1861, 1862, and 1863.

	Five-acre Field.					Ten-acre Field.				
	Un-sewaged,	Sewaged.			Mean.	Un-sewaged,	Sewaged.			Mean.
	Plot 1.	Plot 2.	Plot 3.	Plot 4.		Plot 1.	Plot 2.	Plot 3.	Plot 4.	
Meadow Grass. First Season, 1861.										
1st Crop -	27·9	30·5	26·9	27·7	28·3	22·0	23·3	21·4	18·4	21·3
2d Crop -	24·4	19·8	14·2	13·3	17·9	26·9	17·1	15·1	16·1	18·8
3d Crop -	..	13·4	13·7	12·9	13·3	..	12·6	7·3	14·4	11·4
4th Crop -	..	..	15·4	9·6	12·5	..	16·9	15·1	17·8	16·6
Mean -	26·2	21·2	17·6	15·9	..	24·5	17·5	14·7	16·7	..
Meadow Grass. Second Season, 1862.										
1st Crop -	26·7	22·8	14·4	15·3	19·8	26·9	19·5	13·5	13·1	18·3
2d Crop -	22·8	14·3	16·4	19·4	18·2	17·9	16·2	19·0	16·7	17·5
3d Crop -	..	18·2	12·9	14·2	15·1	..	14·5	14·4	15·8	14·9
4th Crop -	..	..	..	..	..	..	..	..	*33·8	33·8
Mean -	24·8	18·4	14·6	16·3	..	22·4	16·4	15·6	15·2	..
Meadow Grass. Third Season, 1863.										
1st Crop -	36·1	21·5	17·6	16·3	22·9	39·8	18·6	20·0	14·6	23·3
2d Crop -	34·4	18·5	14·9	17·8	21·4	18·2	17·7	16·3	18·3	17·3
3d Crop -	..	17·7	10·9	17·6	15·4	..	12·4	14·6	15·2	14·1
4th Crop -	..	15·8	13·0	12·3	13·7	..	..	13·9	13·6	13·8
5th Crop -	..	..	..	15·3	15·3	..	..	..	..	..
Mean -	35·3	18·4	14·1	15·9	..	29·0	16·2	16·2	15·6	..

Italian Rye Grass, 1863.

	Un-sewaged,	Sewaged.		Mean.
	Plot 1.	Plot 2.	Plot 3.	
1st Crop - -	21·3 *			21·3
2d Crop - -	23·7	18·8	17·5	20·0
3d Crop - -	36·4	27·5	18·3	27·4
4th Crop - -	33·2	13·8	18·9	22·0
5th Crop - -	19·9	16·8	17·8	18·2
6th Crop - -	..	18·6	20·4	19·5
	28·3	19·1	18·6	..

* All three plots were unsewaged until after the first cutting.

TABLE XVIII.—Mean Composition (per cent.) of the Dry Substance of the Grass, without and with Sewage, and in each successive Crop.

In Seasons 1861, 1862, and 1863.

	Without and with Sewage.				Each successive Crop.					
	Un-sewaged,	Sewaged.								
	Plot 1.	Plot 2.	Plot 3.	Plot 4.	1st Crop.	2d Crop.	3d Crop.	4th Crop.	5th Crop.	6th Crop.
Meadow Grass—First Season, 1861.										
Number of analyses giving the means - - - -	5	7	9	9	11	9	7	5		
Nitrogenous substance (N × 6·3)	13·08	18·67	18·92	19·78	10·33	18·07	23·76	28·25		
Fatty matter (ether extract) -	3·21	3·54	3·53	3·44	3·01	3·60	3·65	3·84		
Woody fibre - - - - -	28·80	29·34	30·15	29·13	30·80	28·45	28·50	28·60		
Other non-nitrogenous substances	45·66	37·09	35·94	35·92	47·79	38·28	30·84	24·57		
Mineral matter (ash) - -	9·25	11·36	11·46	11·73	8·07	11·60	13·25	14·74		
	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00		
Meadow Grass—Second Season, 1862.										
Number of analyses giving the means - - - -	4	6	6	7	11	9	6	1		
Nitrogenous substance (N × 6·3)	9·49	15·65	15·70	16·83	11·65	12·70	20·44	18·22		
Fatty matter (ether extract) -	2·93	3·81	3·64	3·85	2·82	3·72	4·34	4·42		
Woody fibre - - - - -	29·80	29·20	29·18	29·86	32·42	29·01	26·69	24·86		
Other non-nitrogenous substances	47·84	40·70	40·50	39·01	44·40	43·87	36·00	38·70		
Mineral matter (ash) - -	9·94	10·64	10·98	10·45	8·71	10·70	12·53	13·80		
	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00		
Meadow Grass—Third Season, 1863.										
Number of analyses giving the means - - - -	4	7	8	9	8	8	6	5	1	
Nitrogenous substance (N × 6·3)	10·31	18·43	20·49	22·38	15·05	16·64	19·88	26·12	32·19	
Fatty matter (ether extract) -	4·08	5·04	4·68	4·83	4·79	4·31	5·00	4·93	5·07	
Woody fibre - - - - -	28·64	26·08	25·62	25·40	26·55	28·07	26·08	23·33	20·51	
Other non-nitrogenous substances	47·29	39·48	37·82	35·79	44·32	39·68	37·05	33·26	29·62	
Mineral matter (ash) - -	9·68	10·97	11·39	11·60	9·29	11·30	11·99	12·36	12·61	
	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	
Italian Rye-grass, 1863.										
Number of analyses giving the means - - - -	5	5	5		1	3	3	3	3	2
Nitrogenous substance (N × 6·3)	12·44	18·78	18·11		12·51	12·86	11·07	16·70	20·91	24·76
Fatty matter (ether extract) -	3·53	4·45	3·85		3·61	3·01	3·28	4·31	4·49	5·13
Woody fibre - - - - -	24·68	25·51	25·55		17·79	26·95	28·79	27·16	22·64	22·16
Other non-nitrogenous substances	49·21	39·76	41·47		56·59	48·28	48·88	40·87	38·34	33·24
Mineral matter (ash) - -	10·14	11·50	11·02		9·50	8·90	7·98	10·96	13·62	14·71
	100·00	100·00	100·00		100·00	100·00	100·00	100·00	100·00	100·00

of succulent leaf; though, even with sewage, the tendency to run to seed is much greater in hot and dry than in cold and wet seasons. Then again, the earlier crops of the season are not only grown under much more favourable maturing conditions, but, from their much greater abundance, they are generally cleared more slowly, and are therefore liable to be in a more advanced stage when cut; whilst the later ones are not only produced under less favourable maturing circumstances, but are frequently much more affected in their condition by unfavourable weather at the time of cutting.

With Italian rye grass, as well as with meadow grass, the herbage in the condition in which it was cut was found to be much more succulent when grown with sewage than without it. In the case of the rye grass, however (though it is true only small quantities of sewage were applied, and the results relate to only one season), the diminution in the proportion of dry substance as the season advanced was somewhat less marked.

The general result is, that there was a less proportion of dry or solid substance in the sewaged grass, as cut, than in the unsewaged; but that a given amount of dry substance in the sewaged was more productive of milk and increase than an equal amount in the unsewaged grass.

The question arises,—was there any difference in the composition of the dry or solid substance of the unsewaged and the sewaged grass which may account for the higher food-qualities of that of the sewaged?

Table XVIII. shows that the most remarkable difference was in the proportion of the nitrogenous constituents, the per-centage of which was in each season much higher in the solid matter of the sewaged than in that of the unsewaged grass, and also the higher the greater the quantity of sewage applied. The proportion of green and impure fatty or waxy matter was also somewhat, but in a less degree than the nitrogenous substance, the greater in the sewaged grass. The comparatively indigestible woody fibre, judging from the results of 1862 and 1863, when the sewaged crops were cut in a younger and more favourable condition than in 1861, will probably average less in sewaged than in unsewaged grass. But the mineral matter, like the nitrogenous and green fatty or waxy matters, is in the larger amount in the sewaged grass, and like them also, a relatively large amount of it is generally indicative of a more unripe and succulent condition.

That the higher milk-yielding qualities of the solid matter of the sewaged grass do not depend simply on its higher per-centage of nitrogenous constituents is evident from the fact that the solid matter of the later crops of the season, which, weight for weight, had much less value as food than that of the earlier, nevertheless contained a very much higher proportion of nitrogenous substance. Indeed, there was generally more than twice as much nitrogenous

substance in a given amount of the solid matter of the last than of the first crop of the season.

It would appear that the higher qualities of the solid matter of the sewaged grass, and of the grass grown in the earlier and more genial periods of the season, were due rather to a favourable condition of maturation, and, therefore, of digestibility and assimilability, of the constituents. That the condition of maturation or elaboration of the constituents had much to do with the quality of the grass is evident from the fact that the produce of the warmer seasons of 1861 and 1863 was much more productive than that of the cold and wet season of 1862. And that a comparatively high per-centage of nitrogenous substance is only advantageous when accompanied with a favourable condition of maturation, may be gathered from the fact that with the higher per-centage of nitrogen in the produce grown in the more favourable seasons of 1861 and 1863 there was higher feeding quality, whilst with the higher per-centage of nitrogen in the produce grown in the later and colder periods of the seasons, there was lower feeding quality.

Italian rye grass seems to be subject to very similar variations in composition, by the application of sewage, and at different periods of the season, as meadow grass; but as the amounts of sewage applied to it were comparatively small, and the results relate to one season only, it can scarcely be judged with certainty, whether or not the changes in composition would, under comparable circumstances, be much the same in degree as well as kind, with the two descriptions of herbage. The feeding results seem to indicate that the Italian rye grass deteriorated somewhat less than the meadow grass as the season advanced, but the difference in chemical composition offers no very obvious explanation of the fact.

IX. *Effects of Sewage on the mixed herbage of grass land in developing the more freely growing, at the expense of the less freely growing plants.*

It is well known that active manures of any kind, when applied to the mixed herbage of grass land, develop certain more freely-growing plants to the partial, or in some cases, the entire exclusion of others. Irrigation, whether by sewage or otherwise, produces very similar effects.

On careful inquiry, and by the aid of samples obtained from some of the most important sewage meadows in the neighbourhood of Edinburgh, it is found that wherever the application has been continued for a considerable number of years, the produce consists almost exclusively of rough meadow grass (*poa trivialis*), common couch grass (*triticum repens*), and in a smaller proportion of rye grass (*lolium perenne*), or rough cock's-foot (*dactylis glomerata*), or both; the chief weed being crow-foot (*ranunculus*), of various

species. In four out of five reports from as many different sewage farmers, the poa is said to stand first, and the couch grass second in degree of prominence. The poa also seems to stand first in estimation as a sewage grass; whilst the common couch is also much valued. Indeed, Mr. Thomson, of Roseburn, informs us that he has actually transplanted this weed of our corn fields from his arable land to lay down for sewage meadow, and that the result has been quite satisfactory; he also informs us that when he has sown as many as 15 or 20 different kinds, most of them have gradually died out, and after some years only a few suitable to the land and the treatment remained. (See notes on the Edinburgh Meadows, Appendix, p. 198 et seq.)

At Rugby similar effects, but at present in a less degree, have been produced. The following observations on the character of the herbage in the two fields are founded upon the records of a careful examination made in August 1862, since which time, however, further change has doubtless taken place on the sewaged plots.

The portion of land left unsewaged by the Commission in the five-acre field had received less sewage previously than that in the ten-acre field, and showed somewhat greater complexity of herbage.

In the five-acre field the most prominent grasses on the unsewaged portion were woolly soft-grass (*holcus lanatus*), common bent grass (*agrostis vulgaris*), rough meadow grass (*poa trivialis*), hard fescue (*festuca duriuscula*), rough cock's-foot (*dactylis glomerata*), and rye grass (*lolium perenne*), with a number of others in much smaller proportion. The herbage also comprised several species of the Leguminous family, besides a number of weeds, of which the most prominent were ribwort (*plantago lanceolata*), milfoil (*achillæa millefolium*), sorrel dock (*rumex acetosa*), and dandelion (*taraxacum dens-leonis*). In the ten-acre, as in the five-acre field, the cock's-foot, woolly soft grass, rye grass, and hard fescue, were among the most prominent of the grasses without sewage, whilst the rough meadow grass, and others, were less prominent than in the five-acre field. The amount of Leguminous herbage was also less than in the five-acre field, whilst crow-foot was extremely abundant.

In the sewaged herbage of both fields the cock's-foot and woolly soft grass were by far the most abundant, the rye grass coming next, and perhaps the rough meadow grass or the hard fescue next, others being more reduced. In both fields the Leguminous herbage was much reduced in proportion under the influence of sewage, whilst in the five-acre field the sorrel-dock, and in the ten-acre the crow-foot, were the most prominent weeds.

In the sewage meadows near Croydon, the cock's-foot and rye grass appear to be the predominating grasses.

The general effect of sewage irrigation on the mixed herbage of meadow land may be stated to be, to develop the Graminaceous

herbage chiefly, nearly to exclude the Leguminous, and to reduce the prevalence of miscellaneous or weedy plants, but much to encourage individual species. It also, at the expense of the rest, encourages a few free-growing grasses, among which, according to locality and other circumstances, the rough meadow grass, couch grass, rough cock's-foot, woolly soft grass, and rye grass, have been observed to be very prominent. The result is an almost exclusively Graminaceous, and very simple herbage. But, as the produce of sewage irrigated meadows is generally either cut or grazed in a very young and succulent condition, the tendency which the great luxuriance of a few very free growing grasses has to give a coarse and stemmy later growth is not an objection, as it is in the case of meadows left for hay. Indeed, as has been already shown, when the produce is given to animals in a green and succulent state, a given weight of the dry or solid substance of the more simple sewaged grass is more productive than an equal weight of that of the more complex unsewaged produce.

X. *Composition of the milk yielded from the unsewaged and from the sewaged grass.*

Once a week during the greater part of the season of 1861, the morning and evening milk of the cows fed on unsewaged grass was mixed together, and a gallon sample taken. Samples of the milk from the sewaged grass were taken in the same way. In 1862 similar samples were collected, but then only once a month. In 1863 none were taken. In all cases the samples were, as soon as taken, put into bottles filled up to the corks, sealed down, and sent off the same evening by railway to Professor Way for analysis.

In 1861 there were in all 13 samples of milk from unsewaged, and 15 from the sewaged grass, and in 1862, six from the unsewaged and six from the sewaged grass so collected and submitted to analysis. The results of each of the 28 analyses of the milk of 1861 were given in Table XLVI. in the Appendix to the previous Report, and those of the 12 made of the milk of 1862 are given in Table XLI., p. 194, in the Appendix to the present Report.

In the following summary Table, XIX., the results of the whole 40 analyses of milk are so classified as to bring to view the chief points of interest.

TABLE XIX.—Mean per-centage Composition of the Milk produced from Unsewaged and Sewaged Grass, alone or with Oilcake in addition, and in different Seasons.

SEASONS 1861 and 1862.

—	Season 1861. Cows fed on Grass alone. Un-sewaged.	Season 1861. Grass alone. Sewaged.	Season 1861. Grass and Oilcake. Un-sewaged.	Season 1861. Grass and Oilcake. Sewaged.	Season 1861. Sewaged Rye-grass and Clover, and Oilcake.	Season 1862. Grass and Oilcake. Un-sewaged.	Season 1862. Grass and Oilcake. Sewaged.
Number of Analyses giving the Means	9.	10.	4.	4.	1.	6.	6.
Casein	3·246	3·241	3·352	3·423	3·125	3·513	3·467
Butter	3·604	3·430	3·657	3·707	3·473	3·834	3·559
Sugar of Milk, &c.	4·405	4·218	4·561	4·689	4·700	4·502	4·440
Mineral matter	0·753	0·776	0·740	0·771	0·752	0·753	0·771
Total solid matter	12·008	11·665	12·310	12·590	12·050	12·602	12·237
Water	87·992	88·335	87·690	87·410	87·950	87·398	87·763
	100·000	100·000	100·000	100·000	100·000	100·000	100·000

The average results of the numerous analyses of the milk of the season of 1861 showed a somewhat lower proportion of each of the constituents—casein, butter, sugar, &c.—and also of total solid substance, but a slightly higher proportion of mineral or saline matter in that from the sewaged than in that from the unsewaged grass, when, for a period of 16 weeks, the cows were fed on grass alone. But when, for a period of four weeks at the end of the season, oilcake was given in addition to the grass, the milk from the sewaged grass contained rather more instead of less of casein, butter, sugar, &c., and total solid matter, than that from the unsewaged; and both kinds of grass, although at the end of the season, gave, with oilcake in addition, milk containing more of each of the constituents mentioned than the grass of the earlier and more genial periods of the season when it was given alone.

In 1862 the season was very cold and wet, and the yield of milk, with cake given in addition to the grass throughout the season, was little if any better than during the period of the more favourable season of 1861, when the cows had grass alone. But both from unsewaged and from sewaged grass the milk of 1862, when oilcake was given, was somewhat richer than that of 1861 without it; and as during the longer period of 1861 when grass was given alone, so now in 1862 when cake was given throughout, the milk from the sewaged grass contained less solid matter, and was in fact somewhat less rich, than that from the unsewaged. This result of an entire season is, of course, more reliable than that obtained with oilcake during the concluding four weeks only of the season of 1861, which showed as above observed a rather

richer milk from oilcake and sewaged than from oilcake and unsewaged grass. Upon the whole it would appear probable that, under otherwise comparable conditions, unsewaged grass will give a slightly richer milk than sewaged, whether given alone or with other food in addition.

The general result is, that a given weight of fresh unsewaged grass, supplying as it did much more solid matter, gave more milk than an equal weight of the fresh sewaged grass; that a given amount of the dry or solid substance of the more succulent sewaged grass gave considerably more milk than an equal quantity of that of the unsewaged; that the addition of oilcake, whether to unsewaged or to sewaged grass, increased the richness of the milk: but that the milk from the sewaged grass (whether given alone or with oilcake) was somewhat less rich than that from the unsewaged.

XI. *Experiments on the application of Sewage to Oats in* 1863.

For reasons that have been already explained, the Commission did not think it desirable to undertake a systematic series of experiments with any other crops than grass. Indeed, so to have extended their inquiry, would have required much more ample funds than were at their disposal for experiments on the agricultural utilisation of sewage. By the kindness of Mr. J. A. Campbell, however, they are enabled to record the results of an experiment on the application of sewage to oats.

In the spring of 1863, in a field from which a crop of clover had been carried off in 1861, and in 1862 a crop of wheat, Mr. Campbell was about to give the then growing crop of oats a top dressing of nitrate of soda. Instead of this, four plots of about an acre each, were set apart and treated as follows:—

Plot 1. Left unmanured.
Plot 2. Sewaged at the rate of 135½ tons per acre.
Plot 3. Sewaged at the rate of 510 tons per acre.
Plot 4. Top-dressed with 1½ cwt. of nitrate of soda.

The applications of the sewage, and of the nitrate, were made much later in the season than was desirable. The sewage was applied from April 28 to May 16 inclusive; the two acres requiring, with the hindrance of gauging by means of a barrel, 16 days for the application by hose and jet of the small quantities stated. The nitrate of soda was sown broadcast, partly on April 24, and partly on May 4.

For several weeks from the time of sowing there was very little rain, so that the plant top-dressed with nitrate of soda was obviously injured by the application for some time, the foliage being much "burnt." The sewage, on the other hand, being applied during dry weather, and the application followed by a very unusally dry period, during which spring corn and even wheat crops were reputed over a considerable range of country to be suffering for want of rain, produced, as might be expected, very marked effects. Owing, too, to the small amount of rain,

the sewage was of more than the average concentration of that of Rugby, and probably about double the average strength of that of the Metropolis (including rain, &c.) The following Table (XX.) shows the results obtained.

Table XX.—Results of Experiments on the application of Sewage to Oats.

Rugby 1863.

Plots.	Manures.	Quantities per Acre. Dressed Corn.		Offal Corn.	Straw.	Increase by Manure. Corn.	Increase by Manure. Straw.	Particulars of Quality. Weight per Bushel of dressed Corn.	Offal Corn to 100 dressed.	Total Corn to 100 Straw.
		Bush.	Pks.	Lbs.	Cwts.	Lbs.	Cwts.	Lbs.		
1	Unmanured - -	55	2½	85	42½	..	..	44	3·5	53·3
2	135½ tons sewage -	69	1¼	212	53	658	10½	43	7·1	53·9
3	510 tons sewage - -	66	2½	302	61	565	18½	42	10·8	45·4
4	1½ cwt. Nitrate of Soda	54	0¼	131	45½	—11	3	44	5·5	49·6

Thus, under the conditions of season described, there was with the nitrate of soda even rather less corn, and only about 3 cwts. more straw, than without manure, and the smaller quantity of sewage gave more increase of corn than the larger, though the latter gave considerably the most straw. Both the sewaged crops were, indeed, too luxuriant to bear up against the heavy rains of June, and the one with the largest amount of sewage was very much laid, and hence the deficient yield of corn in proportion to straw. The last three columns show, by the deficient weight per bushel of the dressed corn, the large proportion of offal corn, and the low proportion of corn to straw, where the largest quantity of sewage was employed, that the defective result as to corn in its case was due to over rather than to under luxuriance. In fact, the usual complaint when sewage has been applied to growing corn crops has been of over production of straw and deficient proportion of corn—that is to say, of a tendency of growth which is as unfavourable in the case of corn as it is favourable in that of grass.

There was, however, a very high gross money return per ton of sewage applied, at any rate where the smaller quantity only was employed. Thus, reckoning oats at 3*s.* per bushel, and oat straw at 20*s.* per load, the gross value of the increased produce from one ton of sewage was—

With $135\frac{1}{2}$ tons of sewage per acre - $5\frac{1}{4}$*d.* per ton.
With 510 tons of sewage per acre - $1\frac{1}{2}$*d.* per ton.

Here, then, with a small quantity of sewage of nearly double the average strength of that of the Metropolis, applied during a period of very dry weather, which was followed by a season of very unusual productiveness—the harvest of 1863 being the best for many years past—the gross value of the increased produce amounted to more than 5*d.* per ton of sewage employed, or to

nearly three times the market value of the constituents of the sewage supposing them to have been extracted and dried.

The smaller amount of sewage applied was equivalent in water to something under an additional $1\frac{1}{2}$ inch of rain at the critical period of growth; and the larger amount was equal to about five inches, which would at that period have been a very great excess, and of itself caused rank and over luxuriant growth on any soil in such condition as the unmanured produce showed the one in question to have been. It is indeed difficult to say how much of actual result obtained was due to the manurial constituents, and how much to the water of the sewage. At any rate, whether considered with regard to the amount of manurial constituents supplied, or the amount of water, an average of 500 tons of sewage per acre to arable land otherwise treated in the ordinary way would most probably be found more than appropriate to the average of soils and seasons, and would most certainly be more than appropiate for heavy lands and for wet seasons; nor even in dry ones, when sewage would be worth a maximum value for some crops by virtue of its water, if applied at the proper time, would more than this amount be required the year round; though it is possible that the demand might be as much beyond the supply for a short period, as the supply would undoubtedly be beyond the demand for very much the greater part of the year so far as arable land was concerned.

XII. *Miscellaneous Results obtained in* 1864.

It has been already stated (Section VII. p. 45) that in order to ascertain whether the meadow land experimented on in 1861, 1862, and 1863 were left in a higher or in a lower condition by the application of sewage, and the removal of the produce during those three years, it was decided that the produce of each plot should, in 1864, be carefully weighed, sampled, and analysed, without any further application of sewage; and also that the soil of the respective plots should be so far submitted to chemical examination as time and other circumstances would allow. The results of this part of the inquiry will form the subject of the present Section.

Owing to the extraordinary drought of the season of 1864, it was, as will be readily understood, as unfavourable as it possibly could be for meadow land without either sewage or other manure. Indeed, from only one plot was any second cutting taken, and then only a few cwts. of green grass were obtained. In all other cases the after-grass came forward so late in the season that it was thought better to feed it off than to cut it.

The following Table (XXI.) shows the amounts of green grass obtained from each plot; and some particulars of the feeding of the remainder of the produce will be given further on.

TABLE XXI.—Produce of Green Grass obtained per Acre in 1864, without Sewage.

Plots.	Treatment in 1861, 1862, and 1863.	Five-acre Field. Dates of Cutting.	Five-acre Field. Quantity.	Ten-acre Field. Dates of Cutting.	Ten-acre Field. Quantity.	Mean of the Two Fields.
		First Crop.				
			tons. cwts. qrs. lbs.		tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.
1	Unsewaged - -	June 18—20	1 14 3 26	June 16 and 17	3 1 2 0	2 8 0 27
2	3,000 tons sewage per acre, per ann.	June 4—9	2 17 2 20	June 8—13	5 12 1 15	4 5 0 3½
3	6,000 tons sewage per acre, per ann.	May 24—30	5 12 0 18	June 1—7	7 4 0 9	6 8 0 13½
4	9,000 tons sewage per acre, per ann.	May 19—23,	5 9 0 17	May 26—June 1	6 11 0 11	6 0 0 14
		Second Crop.				
4	9,000 tons sewage per acre, per ann.	Aug. 24	0 4 3 3	..	- - - -	- - - -

Small as were the amounts of produce on all the plots, it is nevertheless clear that there was much more growth where sewage had been applied in the preceding years than where it had not; and there was more where 6,000 than where 3,000 tons had been applied, even though the crop was in the former case cut some days earlier at the most active period of growth; and from the indications there would doubtless have been more still where 9,000 tons had been annually applied, but for the still earlier dates of cutting.

The evidence so far is, then, that the land was left in the higher condition of productiveness the larger the quantities of sewage applied, and of produce removed, in previous seasons; and although a second cutting was taken in only one instance, and when feeding off the after-grass the plots were not separated so as to afford exact evidence on the point, it may be stated that in both fields the amount of feed was obviously much the greater the greater the quantity of sewage previously applied. Indeed, it is concluded that in each field the plot 4 gave as much after-feed as plots 2 and 3 together.

In the ten-acre field the after-grass of the 4½ to 5 experimental acres kept 8 heifers, of about 7½ cwts. live-weight each, for 11 days, from Nov. 11 to Nov. 22; 104 sheep of about 160 lbs. average live-weight for 14 days, from Nov. 10 (morning) to Nov. 23 (evening); and 102 of the same sheep for 7 days from Dec. 7 to Dec. 14. The five-acre field, where the growth was not so good, kept 32 lambs, averaging about 90 lbs. live-weight, for 35 days from Nov. 18 to Dec. 23.

Further evidence of the effects of the unexhausted residue from the previous sewage manuring is to be found in the difference in the chemical composition of the produce from the respective plots. This point is illustrated by the results of analyses given in the following Table. For further details, *see* Appendix, Table XLII. p. 195.

TABLE XXII.—Composition of the Grass obtained in 1864, without Sewage.

—	First Crop.								2d Crop.
	Five-acre Field.				Ten-acre Field.				Five-acre Field.
	Un-sewaged.	Sewaged in 1861-2-3.			Un-sewaged.	Sewaged in 1861-2-3.			
	Plot 1.	Plot 2.	Plot 3.	Plot 4.	Plot 1.	Plot 2.	Plot 3.	Plot 4.	Plot 4.
Per-cent. in the Fresh Grass.									
Dry Substance	34·70	30·19	28·12	20·33	33·36	30·84	23·63	21·50	55·53
Per-cent. in the Dry Substance of the Grass.									
Nitrogenous substance (N × 6·3)	10·09	13·73	14·91	16·07	11·00	12·95	15·63	13·47	15·85
Fatty matter (ether extract)	3·87	3·66	3·75	4·43	3·88	4·14	5·03	4·85	5·73
Woody fibre	26·64	26·64	27·61	28·21	27·36	27·12	28·21	26·94	29·02
Other non-nitrogenous substances	51·65	48·39	45·33	42·20	50·95	48·17	42·52	46·12	41·81
Mineral matter (ash)	7·75	7·58	8·40	9·09	6·81	7·62	8·61	8·62	7·59
	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00

The first point to remark is, that as the proportion of dry or solid substance was much lower in the earlier cut and less matured sewaged grass than in the later cut unsewaged grass, the difference in the relative amount of the produce per acre on the respective plots was in reality not so great at the actual dates of cutting as the amounts of fresh or green grass recorded in the Table would indicate. The lower per-centages of dry substance in the sewaged grass indicate indeed a less degree of maturity or ripeness at the time of cutting; and with these characters a higher per-centage of nitrogenous substance in the solid matter of the grass would be expected. But the differences in the per-centage of nitrogenous substance which the Table shows are greater than can be accounted for by the earlier or later cutting, and consequent less or greater degree of ripeness.

The solid matter of the unsewaged produce of the one field contained 10, and of the other 11 per cent. of nitrogenous substance; whilst in that of the produce from the previously sewaged plots it ranged from about 13 to about 16 per cent., and was, with one exception, the higher the greater the quantity of sewage previously applied.

It has been shown in Section VIII. that the proportion of nitrogenous substance in the solid matter of the grass was much increased under the influence of sewage, and the results here recorded, taken together with those relating to the amounts of produce per acre, clearly show a considerable effect from the unexhausted residue from the previous sewage manuring, even in so extremely unfavourable a season; and it would doubtless have

been much greater under more favourable circumstances, and will probably be manifest for some time to come.

Although the amount and the composition of the grass obtained in 1864 have clearly shown the effect of the previous sewage manuring, the only partial investigation to which the soils have been submitted does not further illustrate the point. Calculation would, indeed, seem to indicate that there had been considerable accumulation, at a greater or less depth within the soil, of some of the most important manurial constituents of sewage where the larger quantities had been applied, but it was not thought desirable to incur either the necessary delay or the increased expenditure which a sufficiently detailed investigation of the subject would involve.

The results obtained are, however, of considerable interest as showing a very great difference in the character and composition of the soils of the two fields, which to a great extent explains the marked difference in the amount of produce which they respectively yielded without sewage.

Appendix Table XLIII. p. 196, shows the great difference in the general character, and Table XLIV. p. 197, in the chemical composition in some important respects, between the two soils.

It will be recollected that the unsewaged portion of the ten-acre field each year yielded much more produce than that of the five-acre field. The former was known to have a heavier soil, and a more sunny aspect; but these differences were not recognised as fully accounting for the great difference in the natural productiveness. The results of the partial mechanical and chemical analysis show, however, that, within a layer of 9 inches, taken immediately below as thin a sod as could be first removed, the lighter, gravelly, and naturally less productive soil of the five-acre field contained an average of nearly 20 per cent. of stones, whilst similar layers from the ten-acre field did not on the average contain half as much. Again, the separated fine mould from the soil of the five-acre field was sandy, contained about 15 per cent. of moisture, between 5 and 6 per cent. of organic matter, and scarcely one fifth per cent. of nitrogen, whilst that of the more productive ten-acre field was loamy, containing a good deal of clay, about one fourth more moisture, more than one half more organic matter, and about one third more ammonia, or nitrogen in some other form. Or, comparing the composition of the total fresh soils, including stones, instead of that of the separated fine moulds, the differences are in a still greater degree in favour of the soil of the ten-acre field, so far as the indications of natural fertility are concerned.

It is, however, very satisfactory to know, that the soil of the much less naturally fertile five-acre field gave fully as much produce per acre under the influence of liberal dressings of sewage, as that of the naturally much more productive ten-acre field. This result is quite confirmatory of the general opinion, founded on the results of practical experience, that light, and even naturally poor and unproductive soils, are capable of yielding very large crops of grass under the influence of sewage, and that they are, in fact, the best suited for its application.

XIII. *Concluding Observations; general Considerations on the Agricultural Utilisation of Town Sewage.*

There cannot be a doubt that to obtain a maximum amount and gross value of produce from a given amount of sewage it should be applied in small quantities per acre, and in dry weather. But it is clear that the maximum value per ton of sewage which would be obtainable under such conditions would be available only for short periods of the year; and, it is equally certain, that the constant daily supply, the year round, would, at all other times, have to be disposed of at a very different rate, thus reducing the average value very considerably. It is obvious, indeed, that even supposing sewage were distributed over a sufficiently large area to command its full value, both as manure and as water, at the best periods of the year, the much larger remainder must either be sacrificed, or at the best used for grass at periods when its value even for that crop must be very much reduced.

Even assuming that during any considerable portions of each year the Metropolitan sewage would be worth to the farmer 2*d.* per ton distributed over his arable land, there can still be no doubt that the average value the year round would be reduced to considerably below 1*d.* by the use of the remainder in large quantities to grass at the less favourable periods of the season.

Adopting the favourable supposition that as high an average as 500 tons of sewage per acre could be utilised on arable land, and that as low an average as 5,000 tons per acre were found sufficient for Italian rye and meadow grass, the important practical questions arise—would the increased productiveness, and increased gross money return per ton, in the former case, justify the extra cost of distribution over a ten-fold area, and to a great extent by pipes and hose and jet instead of by open runs?—or, having regard, not to the greatest amount of produce and of gross money return, but to the greatest profit, per ton of sewage, would it not be far more remunerative to limit the area, and cost of distribution, at a certain sacrifice of the productiveness of the sewage?

The probability is, however, that the difference of area required under the two systems would be greater than that here assumed for the purpose of illustration; and then, of course, the difference in the cost of distribution of a given amount of sewage would be still further increased. In fact, to utilise the constituents of the Metropolitan sewage over an area at all corresponding to the rate per acre of the smaller and more productive application to oats at Rugby, it would require more nearly a twenty-fold than a ten-fold area as compared with that of such an application to grass land as above supposed.

The great dilution of the Metropolitan sewage, indeed of town sewage generally, its large daily supply at all seasons, and its greater amount in wet weather when the land can least bear, or least requires, more water, render it extremely inappropriate for application on a comprehensive scale to arable land for the growth of corn and other ordinary rotation crops. But, apart from these difficulties, if it can only be distributed in small quantities over large areas at such a cost to the farmer as has as yet been pro-

posed, it is indeed vain to hope that any large proportion of the manurial constituents derived from the consumption of human food in our towns, can be distributed over the area from which they came.

A modified proposition is, to make arrangements for delivering the sewage over a large area, and to all crops, so as to obtain a high price per ton for so much as can be applied under the most favourable conditions of the land, the crop, and the season, having in reserve a sufficient tract of grass land to purify and utilise the surplus not so available. But this surplus would be very large, and the largest at those periods of the year when of the least value even for grass land, so that the gross value per ton of sewage the year round would be very much reduced.

Having regard to the cost of distribution, it is probable that a much more profitable mode of utilisation would be, to limit the area by specially adapting the arrangements for the application of at any rate the greater part, if not the whole, to permanent or other grasses, laid down to take it the year round, trusting to the occasional use to other crops within easy reach of the area so commanded, but relying mainly on the periodically broken up rye-grass land, and on the application to arable land of the solid manure resulting from the consumption of the sewaged grass, for obtaining other produce than milk and meat by means of sewage.

The question arises—how much land would be requisite for the purification and utilisation of the sewage of a given population on such a plan?

Putting out of view, for the moment, the sanitary consideration of the sufficient purification of the sewage, and the economical one of the manurial value of its constituents, and looking merely to obtaining the largest possible amount of green produce from a given area of land, there is scarcely any limit to the amount of sewage that might be employed, even up to 40,000 or 50,000 tons per acre per annum. But, so far as existing experience furnishes data for a judgment on the point, it may be concluded that the use of about 5,000 tons per acre, judiciously applied to grass land properly laid down to receive it, would, in a great majority of cases, secure the most profitable utilisation. Where, however, the drainage from the sewaged land must be turned into a river, other considerations than those relating only to the most profitable utilisation at once arise. Such an application as is here supposed would doubtless ensure a sufficient purification of the water to admit of its being turned into rivers without fear of detriment to fish; whilst, any streams receiving such drainage instead of that direct from the towns would, at any rate, be vastly improved from their previous condition as a water supply for other towns; but, whether or not, when this most important point has to be taken into consideration, the purification would be sufficient with an application of as much as 5,000 tons per acre per annum, is a question which requires the aid of further experience, and

further investigation, to answer satisfactorily, and which may, indeed, receive a different answer in different cases.

Assuming that the excretal matters of each individual of the Metropolitan area are, or will be, on the average, diluted with 100 tons of water per annum, including water supply, rainfall, and subsoil water, 5,000 tons of sewage would be contributed by fifty individuals in a year, and at this rate, a population of 3,000,000 would require, for the purification and utilisation of its sewage, an area of about 60,000 acres annually under irrigation. So far as Italian rye grass were grown, it might be estimated that the land devoted to it would one year in three be broken up, and some other crop be grown upon it, and to a corresponding extent the area laid down for irrigation would require to be extended beyond the 60,000 acres supposed. Then again, it is obvious that the manure produced by the consumption of the sewaged grass must either be re-distributed by means of water, in which case the area under actual irrigation would be again increased, or, if collected and used in the solid form, it would be appropriate for application to arable land, and so to the growth of corn and other products; and it is obvious that for the most profitable utilisation in this way of the manure derived from the consumption of the sewaged grass, such arable land would require to be either within the area laid down for irrigation, or so near its limits as to reduce the cost of carriage as far as possible.

The experiment with oats above referred to, and that with wheat made by the Chairman of the Commission, the Earl of Essex, the results of which his lordship gave in his evidence before the Sewage Committee of 1862, are the only cases in which exact quantitative results have been recorded of the effects of sewage applied to corn crops.

In the case of the experiment of the Earl of Essex, nothing is known of the strength of the sewage, and nothing is recorded of the characters of the season.

In the case of those with oats at Rugby, as already observed, the sewage was stronger than the average of that of Rugby, and much stronger than the average of that of the Metropolis, the weather was unusually dry at the time of the application, and the season was upon the whole one of very extraordinary productiveness, and, under these conditions, a very high gross return was obtained for a given amount of sewage. Judging from the results of the Earl of Essex, it is probable that the circumstances, both as to the strength of the sewage and character of the season, were in his case also unusally favourable.

At any rate, these isolated results, the one obtained under conditions known to be far above an average character, and the other under entirely unknown conditions, are obviously quite inappropriate as the basis for general conclusions as to the probable average results obtainable on the application of sewage to arable land for corn and other rotation crops.

It is, indeed, desirable that systematic trials should be made with different corn and other rotation crops, through several consecutive seasons, and that the results should be accurately recorded for the guidance of the public.

Although there is still wanting evidence of an exact and quantitative kind upon which to found estimates of the probable average results obtainable over various seasons, on the application of given quantities of sewage, of known strength, to corn and other rotation crops, yet evidence of common experience as to the applicability, in a practical or economical point of view, of sewage to such crops, is by no means wanting. The most extensive and systematic trials have been made at Rugby, Watford, and Alnwick.

At Rugby, the sewage from a population of between 6,000 and 7,000 individuals is collected in a receiving tank, from which it is pumped by a 12-horse power engine through iron pipes which are laid down for the distribution over 470 acres of mixed grass and arable land. These arrangements have been in existence for about 11 years. About 190 acres of the land so piped have, from the commencement, been held by J. A. Campbell, Esquire. But he has gradually limited the area of application, until, during the last few years, he has abandoned the use of the hose and jet, excepting occasionally on a small scale, and confined the application almost exclusively to from 12 to 20 acres of meadow and Italian rye grass. The greater part of the remainder of the 470 acres was, for some time previous to 1861, held by Mr. Berry Congreve, who, after trying sewage on arable as well as grass land, was glad to give up his holding, after having sustained considerable loss. The present tenant of the sewage works, and of the land formerly held by Mr. Congreve, is Mr. Bicknell Mullins, who entered into the occupation in 1861, and although he had between 250 and 300 acres laid down for the application of sewage to crops generally, and by hose and jet, he in practice confines it to about 100 acres of grass land, and applies it almost entirely by open runs.*

The result at Rugby is, then, that after about eleven years of practical experience, with arrangements adapted for the application of sewage to arable land, and to all crops, its use to any other crops than meadow and Italian rye grass forms no part of the general system adopted, and is, in fact, entirely exceptional.

In the neighbourhood of Watford, the Earl of Essex laid down pipes for the application of the sewage of the town by hose and jet to about 210 acres of mixed arable and grass land. The result which his lordship obtained on the application of only 13¼ tons of sewage to an acre of wheat has frequently been held to be conclusive proof of its applicability in small quantities, over large areas, and to all crops. But, in the evidence given by his lordship before the Sewage Committee of 1862, he stated, very

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* Since the above was in type Mr. Mullins has informed us that during the dry season of 1864 he applied sewage to about four acres of roots, and apporently with good results.

emphatically, that his great error had been the piping of too much land; that the sewage of Watford, derived from a population of about 4,000, was not sufficient for more than about 60 or 70 acres; that he required 5,000 tons per acre for 10 acres of rye-grass; and that applying the remainder to 35 acres of meadow, he really had none to spare for wheat. It should be added, that, since the date of this evidence, the area of application has been still further contracted.

In other words, the result at Watford is, that although the abandonment of one acre of rye-grass would set free sewage enough for nearly 40 acres of wheat, if only applied at the rate which yielded the large profit which has been so frequently quoted, yet his lordship's practical experience has led him to prefer the application to the one acre of rye-grass, rather than to the nearly 40 acres of wheat.

In the neighbourhood of Alnwick, the Duke of Northumberland, some years ago, put down machinery and piping for the distribution of the sewage of from 6,000 to 7,000 individuals, over about 270 acres of mixed arable and grass land. It was applied in small quantities to various rotation crops, and in larger quantities to grass; but after a very short time the tenants who had the free use of the sewage for the cost of its application, entirely abandoned it; and the Bailiff of the district, who reports the failure, expresses his opinion strongly against the applicability of sewage to arable land. The failure at Alnwick has been attributed by those connected with the undertaking, to the great dilution of the sewage; and the analyses recorded of it would indicate a composition even much below that of the probable average of the Metropolitan sewage. But Mr. Rawlinson, who directed the sewerage arrangements at Alnwick, states, that not only are water-closets universal, but that the supply of water from all sources is certainly very much lower per head of the population contributing to the sewage there than in the case of the Metropolis; and it is obvious that, if this be the case, the average sewage must be in a corresponding degree the stronger.

At Edinburgh sewage has been applied to some portions of grass land for about 200 years, to a considerable portion for more than 60, and to most of the land now under irrigation, amounting to about 395 acres, for more than 30 years. It is there that larger amounts of sewage are applied per acre than anywhere else, and it is there that larger amounts of produce are obtained per acre than anywhere else. There is, however, no doubt, that at Edinburgh there is not only great waste of manurial constituents, but very imperfect purification of the sewage. The distribution is entirely by means of open runs. In two instances arrangements have been made for raising the sewage, by pumping, an inconsiderable number of feet; but it has been found that the cost has been too great to allow a sufficient quantity to be applied per acre, and hence the application in this way has been much limited, if not on some portions of the land entirely aban-

doned. The application to ordinary rotation crops, on arable land, forms no part of the system adopted at Edinburgh.*

Next to Edinburgh, the attempt to utilize sewage on a large scale which has been the most succesful so far as the amount of produce obtained per acre is concerned, is that of Mr. Marriage in the neighbourhood of Croydon, where about 250 acres of meadow and Italian rye grass annually receive an amount of sewage which averages rather more than 6,000 tons, and represents the excretal matters of between 60 and 70 persons per acre per annum. As, however, the fluid is always passed over several portions of land in succession, by which means a considerable portion is used on an average about $2\frac{1}{2}$ times over, it results that each acre receives annually $6{,}000 \times 2 \cdot 5 = 1{,}5000$ tons of fluid—*less* the amount which evaporates or passes off below the drains which collect and carry it off from one portion to be utilised on another. An enlargement of the area is, indeed, contemplated, which, notwithstanding the rapid increase of the population of the neighbourhood, will, if carried out as proposed, somewhat reduce the amount of fluid and of excretal matters available per acre below the quantities above stated. Mr. Marriage has not yet applied sewage in any systematic manner to arable land; but he was intending to try its effects upon root-crops during the past season (1864).†

In attempting to estimate by the aid of the evidence afforded by these various trials on a large scale, carried out by practical men with a view to profit, the value to the farmer of a ton of town sewage, we may, on account of the conditions above stated, exclude the Edinburgh results from our consideration.

At Croydon, again, the undertaking is of too recent establishment, the results have been obtained over too few seasons, and the present contract was made, on either side, under such disadvantages or uncertainty, that the experience there does not provide the adequate data for such an estimate. It may be observed, however, that after deducting £4 rental from the estimated gross value of the produce per acre at present prices, the gross return is, so far as can be calculated, with Italian rye grass from $\frac{3}{4}d.$ to $1d.$, and with meadow grass from $\frac{1}{2}d.$ to $\frac{3}{4}d.$ for each ton of sewage employed. But there can be little doubt, that if the supply of such produce were very greatly increased, the present market price would not be maintained.

At Rugby, where for about eleven years arrangements have been made for the distribution of small quantities of sewage over a large area, and to all crops, and where the sewage is much stronger than that of the Metropolis, the cost to the tenants averages about $\frac{3}{4}d.$ per ton delivered at the hydrants in the fields. Yet, both the present tenants have been glad, rather than incur the loss of using the sewage themselves at that cost, to get rid of it for the purposes of these experiments, at rates which,

* For further particulars relating to the Edinburgh sewage meadows, see Appendix No. 2. p. 198, et seq.

† For further details relating to Croydon, see Appendix No. 3. p. 202, et seq.

though three times as high during the six summer as during the six winter months, have averaged the year round scarcely, but very nearly, 1*d.* per ton at the hydrants.

Lastly on this point, in his evidence before the Sewage Committee of 1862, the Earl of Essex stated, as the result of his experience, which it will be remembered included the very favourable result with wheat, that in his opinion sewage would not be profitable to the farmer unless he could have it at from $\frac{1}{2}d.$ to $\frac{3}{4}d.$ per ton.

The experiments at Rugby to which this Report refers, having been conducted on feeding meadow land of more than average quality, the produce without sewage was doubtless considerably more than would be obtained from the average of such land as is likely to be devoted to the growth of grass by means of sewage on the large scale. For this reason, and also on account of the less perfect purification and utilisation of the sewage than would be attained where a large tract were so laid down as to allow of the passage of the fluid from one plot over a second, and so on, until it were properly exhausted, the amounts, and value, of the increase estimated according to the actual results of the experiments as due to the application of given quantities of sewage, are probably below those which would be attainable under good management in actual practice on the large scale.

Reviewing the whole of the results, both of the experiments and of the experience of common practice on the subject hitherto, with due regard to the circumstances under which they were obtained, and having regard also to both urban and rural interests, it is considered that an application of about 5,000 tons of sewage per acre per annum, to meadow or Italian rye grass, will, in a great majority of cases, prove to be the most profitable mode of utilisation. It is at the same time considered pretty certain that the farmer would not pay $\frac{3}{4}d.$, and even very doubtful whether he could afford to pay $\frac{1}{2}d.$ per ton, the year round, for sewage of the average strength of that of the Metropolis (excluding storm water) delivered on his land.

Summary.

The results of the whole inquiry may be briefly enumerated as follows:—

1. As there is a daily supply of sewage the year round, which, on sanitary and engineering grounds, it is essential to dispose of as soon as it is produced, and as passing it over land is the best mode both of purifying and utilising it, it should be employed for purposes of irrigation, and be applied in winter, when of comparatively little value, as well as in summer, when of more.

Results obtained on the Application of Sewage to Meadow and Italian Rye Grass.

2. By the application of sewage to grass land during the winter months a very early cut or bite of green food may be obtained, but the amount of increased produce due to the winter application is comparatively small for the amount of sewage employed.

3. By means of sewage irrigation the period during which an abundance of green food was available was extended considerably a the end as well as at the beginning of the season, and the more so the larger the quantity of sewage applied, almost up to the highest amount employed—namely, 9,000 tons per acre.

4. One of the experimental fields gave much less produce per acre without sewage than the other, and analysis showed its soil to be much less naturally fertile; but it gave fully as much produce per acre under the influence of liberal dressings of sewage as the naturally much more fertile soil.

5. Taking the average over three years, and in the two fields, the amount of produce obtained without sewage was about $9\frac{1}{4}$ tons, of green grass per acre per annum, equal about 3 tons of hay; and with 3,000, 6,000, and 9,000 tons of sewage per acre per annum the amounts were, respectively, about $22\frac{1}{4}$, $30\frac{1}{4}$, and $32\frac{1}{2}$ tons of green grass—equal respectively (reckoned according to the percentage of dry substance in each) about 5, $5\frac{3}{4}$, and $6\frac{1}{2}$ tons of hay.

6. The largest quantities of produce per acre were obtained in the third year of the experiments, and with 9,000 tons of sewage per acre per annum; namely, in one field 35 tons, and in the other 37 tons of green grass, equal respectively about 6 tons $12\frac{3}{4}$ cwts., and 7 tons 1 cwt., of hay.

7. The average increase obtained for each 1,000 tons of sewage was—when 3,000 tons per acre per annum were applied, about 5 tons of green grass; when 6,000 tons were applied, 4 tons $2\frac{1}{2}$cwts.; and when 9,000 tons were applied, 3 tons $3\frac{1}{4}$ cwts. of green grass.

8. The amount of produce per acre was the greater the greater the quantity of sewage applied, up to 9,000 tons per acre; but the amount of increase of produce obtained for a given amount of sewage was the less where the greater amounts were applied.

9. Experiments with rye grass were made in one season only, sewage was not applied until the end of April, and comparatively small quantities were put on. The results so obtained indicated much about the same amount of increase of produce for a given amount of sewage as with meadow grass.

Results obtained with fattening Oxen.

10. When cut and given to fattening oxen tied up under cover, more sewaged than unsewaged grass, reckoned in the fresh or green state, was both consumed by a given weight of animal within a given time, and required to produce a given weight of increase; but, of real dry or solid substance, less of that of the sewaged than of the unsewaged grass was required to produce a given effect.

11. When cut grass was given alone the result was very unsatisfactory; but when oilcake was given in addition the amount of increase upon a given weight of animal within a given time, and for a given amount of dry substance of food consumed, was not far short of the average result obtained when oxen are fed under cover on a good mixed diet.

12. The money return, whether reckoned per acre or for a given amount of sewage, was much less with fattening oxen than with milking cows.

Results obtained with milking Cows.

13. When cows were fed on unsewaged, or sewaged grass, as much as they chose to eat, a given weight of the animal was more productive, both of milk and increase, but especially of milk, on the unsewaged than on the sewaged grass.

14. From a given weight of unsewaged grass, reckoned in the fresh or green state, more milk was produced than from an equal weight of fresh sewaged grass; but a given weight of the dry or solid substance supplied in sewaged grass was on the average more productive than an equal weight supplied in unsewaged grass.

15. The milk producing quality of the grass was very different in different seasons, and at different periods of the same season. It was very inferior in the wet and cold season of 1862, and towards the close of the seasons as compared with the earlier periods. It appears probable that Italian rye grass deteriorates less towards the end of a season than meadow grass. On the average, about six parts by weight of fresh grass yielded one part by weight of milk.

16. By the aid of sewage, the time that an acre would keep a cow, and the amount of milk yielded from the produce of an acre, were increased between three and four-fold.

17. So far as the results of the experiments afford the means of judging, it is estimated that with an application of about 5,000 tons of sewage per acre per annum to meadow land, an average gross produce of not less than 1,000 gallons of milk per acre per annum may be expected.

18. In experiments conducted with Italian rye grass (but in one season only), more milk was obtained by the use of a given amount of sewage applied to it than to meadow grass.

19. With an application of about 5,000 tons of sewage per acre per annum, an average gross return of from 30*l.* to 35*l.* per acre, in milk at 8*d.* per gallon, may be anticipated.

Composition of the Rugby Sewage.

20. The mean of 93 analyses, of as many samples, of the Rugby sewage, collected over a period of 31 months, shows $6\frac{1}{2}$ grains of ammonia, and $87\frac{1}{2}$ grains of total solid matter, per gallon; equal to $207\frac{3}{4}$ lbs. of ammonia, and 2,803 lbs. of total solid matter per 1,000 tons. Or, taking the mean of the average composition fixed by the analyses for each of the 31 months, instead of the direct mean of the total 93 analyses, the average contents would be almost exactly 7 grains of ammonia, and $92\frac{1}{2}$ grains of total solid matter per gallon; equal to 224 lbs. or 2 cwts. of ammonia, and 2,960 lbs., or about $26\frac{1}{2}$ cwts. of total solid matter, per 1,000 tons.

21. Although each sample analysed was the mixture of portions taken every two or three hours for several days together, the variation in composition at different times was very great; the amount of ammonia varying in the different mixed samples from $2\frac{1}{2}$ to about $15\frac{1}{2}$ grains per gallon, or from $81\frac{1}{2}$ to $500\frac{1}{2}$ lbs. per 1,000 tons, whilst the total solid matter varied from about $37\frac{1}{2}$ to about 270 grains per gallon, or from 1,203 to 8,637 lbs. per 1,000 tons.

22. 1,000 tons of the average sewage of Rugby represent the excretal and other matters of from 17 to 18 average individuals of a mixed population of both sexes and all ages for a year, and contain ammonia equal to that in from 11 to 12 cwts. of Peruvian guano; or, about 1,700 tons of such sewage would contain nitrogen reckoned as ammonia equal to that in 1 ton of Peruvian guano.

23. It is estimated that there are at Rugby, including rainfall, &c., on the average from 55 to 60 tons of sewage per head of the population per annum.

24. Judging from the average composition of the Rugby sewage, and of various crops, it is concluded that potass would be more likely than phosphoric acid to become deficient where town sewage was applied constantly to grass-land, whilst phosphoric acid would be more likely to become deficient than potass if it were applied to the ordinary crops of rotation.

Estimated average Composition of the Metropolitan Sewage.

25. There is as yet no record of the analysis of any samples or sample of sewage collected under circumstances fairly to represent the average Metropolitan sewage either with or without rainfall and subsoil water.

26. It is estimated that the Metropolitan sewage amounts on the average to about 60 tons without, and probably to about 100 tons with, rainfall and subsoil water, per head of the population per annum.

27. It is estimated that, including human excretal and other matters, there are annually contributed to the Metropolitan sewage about $12\frac{1}{2}$ lbs. of ammonia per head of the mixed population of both sexes and all ages.

28. Reckoned according to the currently adopted trade prices of the several constituents, taking dry and portable manures as the standard, the total annual value of the manurial constituents contributed to the sewage, supposing them to be extracted and dried, would amount to 8*s.* 4*d.* per head of the population.

29. Accordingly, in the dry weather sewage of the Metropolis, reckoned at 60 tons per head per annum, there will be about $6\frac{1}{2}$ grains of ammonia per gallon, and the manurial constituents in 1 ton, if extracted and dried, would be worth about $1\frac{2}{3}$*d.*; and in the average sewage with rainfall, &c., reckoned at 100 tons per head per annum, there will be scarcely 4 grains of ammonia per gallon, and the total manurial constituents in 1 ton will have an estimated value of 1*d.*

30. 1,000 tons of the average Metropolitan sewage without rainfall, reckoned at 60 tons per head per annum, represent the excretal and collateral manurial matters from nearly 17 average individuals, and contain ammonia equal to that in about 11 cwts. Peruvian guano; and 1,000 tons with rainfall, reckoned at 100 tons per head per annum, represent the manurial matters from 10 average individuals, and contain ammonia equal to that in about 6½ cwts. Peruvian guano. In other words, about 1,800 tons of the average Metropolitan sewage without, and about 3,000 tons of the average sewage with rainfall, &c., would contain nitrogen reckoned as ammonia equal to that in 1 ton of Peruvian guano.

31. The value of the total manurial constituents in sewage, reckoned according to the currently adopted trade prices of the several constituents, taking dry and portable manures as the standard, is pretty exactly indicated by putting a value of 8*d.* on every lb. of ammonia, or by giving a value of one farthing per ton for every grain of ammonia per gallon of the sewage. But this theoretical value, according to composition and the trade prices of the constituents, cannot, of course, be taken as directly indicating the value realized, or realizable, by the agricultural utilisation in various ways, of sewage of different strengths.

32. It is very desirable that as soon as the Main Drainage system is sufficiently advanced and in practical working, competent persons should be appointed to undertake the gauging, sampling, and analysis, of the Metropolitan sewage, in such manner as satisfactorily to determine its average composition in the condition in which it will have to be dealt with in any plan of utilisation.

Composition of the Drainage Water (Rugby).

33. Analyses of the drainage water passing from the experimentally sewage-irrigated land at Rugby showed that those constituents which are of the most value, because the most liable to become relatively exhausted, had been the most efficiently retained by the soil, but that the water still contained a considerable amount of valuable manurial matters, besides a large quantity of other substances less important as manure, but affecting the purity of the water.

34. When large quantities of sewage are applied to grass land the arrangements should be such as to allow of the water being used more than once, so that both the utilisation and the purification may be as complete as possible.

Chemical Composition of the Grass.

35. The sewaged meadow grass, as cut and given to the animals, contained a less proportion of dry or solid substance than the unsewaged; and the grass cut during the later portions of the season (both unsewaged and sewaged) contained less solid matter than that cut during the more genial periods of growth.

36. Italian rye grass, in the condition as cut, was also found to be more succulent and to contain less solid matter when grown with sewage than without it; but the proportion of dry substance diminished less as the season advanced in its case than in that of the meadow grass.

37. The proportion of nitrogenous substance (and also of impure waxy or fatty matter) was much greater in the solid matter of the sewaged, than in that of the unsewaged grass. The proportion of nitrogenous substance was also much higher in the solid matter of the grass grown towards the end than earlier in the season. The proportion of indigestible woody fibre was much about the same in the dry substance of the unsewaged and of the sewaged grass. It progressively diminished as the season advanced, and was generally lower in the dry substance of the Italian rye than in that of the meadow grass.

38. A given amount of the dry substance of grass grown in a cold and wet season, or during the cold and wet periods of the year, generally contains more nitrogenous substance, but is less productive than that of grass grown in more genial weather.

39. The greater productiveness in milk and increase of a given amount of the solid matter of the sewaged grass appears to depend more on a favourable condition of maturation, digestibility, and assimilability, of the constituents, than on the actual per-centage amount of any of those determined, and above enumerated.

Effects of Sewage on the mixed Herbage of Grass Land.

40. The effect of sewage irrigation on the mixed herbage of grass land is to develop the Graminaceous plants chiefly, nearly to exclude the Leguminous, and to reduce the prevalence of miscellaneous or weedy plants, but much to encourage individual species.

41. Among the grasses which have been observed to be the most encouraged by sewage are (according to locality or other circumstances) rough meadow grass, couch grass, rough cock's foot, woolly soft grass, and perennial rye grass; two or three only remaining in any considerable proportion after sewage has been liberally applied for some years.

42. The produce of sewage irrigated meadows being generally cut or grazed very young, the tendency which the great luxuriance of a few very free growing grasses has to give a coarse and stemmy later growth is not an objection as in the case of meadows left for hay; a given weight of the dry or solid substance of the more simple sewaged grass being, when consumed green, more productive than an equal weight of that of the more complex unsewaged herbage.

Composition of the Milk from the unsewaged and the sewaged Grass.

43. Although more milk was obtained from a given weight of the dry or solid substance of sewaged than of unsewaged grass, there was comparatively little difference in the composition or

richness of the milk from the two kinds of grass. That from the sewaged grass was, however, slightly the less rich, containing somewhat less of casein, butter, sugar, and total solid matter (though more mineral matter) than that from the unsewaged.

44. When oilcake was given with the grass (whether sewaged or unsewaged) the richness of the milk was notably increased.

Results obtained on the Application of Sewage to Oats.

45. In an experiment with oats in which $135\frac{1}{2}$ tons of sewage were applied per acre, the gross value of the increased produce amounted to more than 5*d.* per ton of the sewage employed, or to about three times the market value of the constituents of the sewage, supposing them to have been extracted and dried; and in another experiment in which 510 tons were applied per acre, the gross value of the increased produce amounted to about $1\frac{1}{2}$*d.* per ton of the sewage employed.

46. In the experiment with the smaller quantity of sewage the supply of water was equivalent to something under an additional $1\frac{1}{2}$ inch of rain at the critical period of growth, and in that with the larger amount to about 5 inches, which proved to be a great excess at the period of the season at which it was applied, there being an over production of straw, and the crop being much laid. Both experiments were made in the unusually productive season of 1863, and with sewage of about double the average strength of that of the Metropolis, which was applied during a period of very dry weather. It is obvious, therefore, that the results were quite exceptional, and cannot be taken as indicating what might be expected from the application of small quantities of sewage to corn crops on different soils, and on the average of seasons.

47. It is probable that 500 tons of sewage per acre is more than would be appropriate to arable land otherwise treated in the ordinary way, taking the average of soils and seasons; and it is certainly more than would be appropriate for heavy lands, and for wet seasons.

General Conclusions.

48. To obtain a maximum amount and gross value of produce from a given amount of sewage, it should be applied in small quantities per acre, and in dry weather; but the great dilution of town sewage, its large daily supply at all seasons, and its greater amount in wet weather, when the land can least bear, or least requires, more water, render it quite inappropriate for application on a comprehensive scale to arable land for corn and other ordinary rotation crops.

49. Supposing arrangements were made for distributing sewage over a sufficiently large area to command a full value, both as manure and as water, at the most favourable periods of the year, the cost of main distribution would be very great, the application to the arable land would require to be chiefly by the expensive means of piping and hose and jet, instead of open runs, and but a

small proportion of the total sewage could be so used, leaving the remainder to be applied in large quantities to grass-land, at the less favourable periods of the year, and, of course, to realize a much lower value.

50. Having regard to the cost of distribution, it is probable that the most profitable mode of utilisation would be to limit the area by specially adapting the arrangements for the application of the greater part, if not the whole, to permanent or other grasses laid down to take it the year round, trusting to the occasional use to other crops within easy reach of the line or area so commanded, but relying mainly on the periodically broken up rye-grass land, and on the application to arable land of the solid manure resulting from the consumption of the sewaged grass, for obtaining other produce than milk and meat, by means of sewage.

51. It is probable that about 5,000 tons of sewage per acre, judiciously applied to grass-land properly laid down to receive it, would, in a great majority of cases, secure the most profitable utilisation.

52. Supposing an application of 5,000 tons of sewage per acre per annum to grass land, the purification of the water would doubtless be sufficient to admit of the drainage being turned into rivers without fear of detriment to fish; whilst any streams receiving such drainage instead of that direct from the towns would at any rate be vastly improved from their previous condition as a water supply; but whether the purification would be sufficient with such an application is a question which requires further experience and investigation to answer satisfactorily, and which will probably receive a different answer in different cases.

53. Assuming that the average dilution of the Metropolitan sewage, including rainfall and subsoil water, will amount to 100 tons per head per annum, 5,000 tons would represent the excretal and other matters of 50 average individuals; and a population of 3,000,000 would require about 60,000 acres constantly under irrigation.

54. The only records of exact quantitive results obtained on the application of town sewage to corn crops are those of the experiments of the Earl of Essex on wheat, and those of the experiments with oats at Rugby given in this Report, and in both cases the increase of produce represented a very high gross money return per ton of sewage employed. The circumstances of the experiments at Rugby were, however, quite exceptional; and, where the most extensive trials of the application of sewage to corn crops have been made with a view to profit, namely, at Watford, Rugby, and Alnwick, the practice has been abandoned; whilst neither at Edinburgh nor Croydon, where the best results have been obtained with grass, does the application to corn and other rotation crops constitute a part of the general system adopted.

55. Judging both from the results of the experiments, and from the experience of common practice, it is considered that the most

profitable utilisation of town sewage will in most cases be attained by the application of about 5,000 tons per acre to meadow or Italian rye grass; but that the farmer would not pay $\frac{3}{4}d.$, and probably not $\frac{1}{2}d.$, per ton, the year round, for sewage of the average strength of that of the Metropolis (excluding storm water), delivered on his land.

JOHN BENNET LAWES.

J. THOMAS WAY.

APPENDIX.

APPENDIX No. 1.

Detailed Records relating to the Experiments made at Rugby.

Table I.

Detailed Record of the Sewage applied to Permanent Grass Land. Second Season 1861–2.

Dates.	Five-acre Field.					Ten-acre Field.				
	Average time taken to fill Gauge-tank (3·216 tons).	Time of application.	Sewage applied (calculated per acre).			Average time taken to fill Gauge-tank (3·216 tons).	Time of application.	Sewage applied (calculated per acre).		
			Plot 2. (Area ·99375 acre.)	Plot 3. (Area ·93081 acre.)	Plot 4. (Area 1·00512 acre.)			Plot 2. (Area ·9875 acre.)	Plot 3. (Area ·99588 acre.)	Plot 4. (Area 1·00019 acre.)
	Mins.	H. M.	Tons.	Tons.	Tons.	Mins.	H. M.	Tons.	Tons.	Tons.
Nov. 4	15·50	2 45	..	..	34·06	9·50	2 0	41·14	..	..
5	13·66	5 0	71·07	..	..	15·00	4 0	..	51·67	..
"	14·33	6 15	..	90·41	..	11·50	2 0	..	33·70	..
"	..	..	..	..	..	13·00	7 0	..	..	103·88
6	14·16	11 15	..	..	152·52	10·50	2 0	..	..	36·75
11	13·83	10 0	..	..	138·81	9·50	2 0	41·14	..	..
12	14·67	10 0	..	141·31	..	13·50	3 0	..	43·06	..
"	..	..	..	..	..	11·50	2 0	..	33·70	..
"	..	..	..	..	..	12·67	7 15	..	..	110·39
13	14·00	6 15	86·68	..	..	10·50	2 0	..	..	36·75
"	13·00	4 0	..	..	59·07	..	..	..	..	..
14	..	..	..	..	..	9·50	2 0	..	40·79	..
15	..	..	..	..	..	11·50	2 0	33·98	..	..
16	..	..	..	..	..	11·50	2 0	..	..	33·55
18	14·50	9 15	..	..	122·47	..	..	..	..	..
19	15·16	9 45	..	133·32	..	13·50	5 0	..	71·76	..
"	..	..	..	..	..	14·67	5 0	..	..	65·75
20	14·67	6 0	79·42	..	..	..	..	..	..	..
"	14·34	4 0	..	..	53·55	..	..	..	..	..
25	14·16	9 45	..	..	132·19	..	..	..	..	..
26	15·00	9 45	..	134·75	..	14·50	5 0	..	66·81	..
"	..	..	..	..	..	15·00	5 0	..	..	64·31
27	15·34	6 0	75·95	..	..	..	..	..	..	..
"	14·67	4 0	..	..	52·34	..	..	..	..	..
Total -	(14·42)	114 0	313·12	499·79	745·01	(12·61)	59 15	116·26	341·49	451·38
Dec. 2	14·00	9 0	..	..	123·41	..	..	..	..	..
3	14·16	9 45	..	142·74	..	13·67	5 0	71·47	..	..
"	..	..	..	..	..	14·50	5 0	..	..	66·52
4	15·34	6 0	75·95	..	..	..	..	..	..	..
"	15·34	4 0	..	..	50·06	..	..	..	..	..
17	14·34	5 0	..	..	66·94	13·34	5 0	..	..	72·31
18	14·00	5 0	..	74·04	..	..	..	..	..	..
"	14·00	5 0	..	..	68·56	..	..	..	..	..
23	15·00	9 15	..	..	118·39	..	..	..	..	..
24	15·34	4 0	50·63	..	..	13·67	5 0	..	70·87	..
"	14·00	5 45	..	85·14	..	13·00	5 0	..	..	74·20
30	15·80	8 15	..	..	100·24	..	..	..	..	..
31	15·00	9 15	..	127·84	..	13·34	5 0	..	72·62	..
"	..	..	..	..	..	13·50	4 30	..	..	64·31
Total -	(14·66)	80 15	126·58	429·76	527·60	(13·56)	34 30	71·47	143·49	277·34

Table I.—*continued.*

Detailed Record of the Sewage applied to Permanent Grass Land. Second Season 1861–2.

Dates.	Five-acre Field. Average Time taken to fill Gauge-tank (3·216 tons).	Five-acre Field. Time of application.	Five-acre Field. Sewage applied (calculated per acre). Plot 2. (Area ·99375 acre.)	Plot 3. (Area ·93081 acre.)	Plot 4. (Area 1·00512 acre.)	Ten-acre Field. Average Time taken to fill Gauge-tank (3·216 tons).	Ten-acre Field. Time of application.	Ten-acre Field. Sewage applied (calculated per acre). Plot 2. (Area ·9875 acre.)	Plot 3. (Area ·99588 acre.)	Plot 4. (Area 1·00019 acre.)
	Mins.	H. M.	Tons.	Tons.	Tons.	Mins.	H. M.	Tons.	Tons.	Tons.
Jan. 1	15·00	3 30	45·31	..	..	..	..	..	..	..
6	15·16	9 45	..	..	123·47	..	..	..	..	..
7	15·16	9 45	..	133·32	..	12·00	4 45	77·35	..	..
„	..	..	..	..	..	12·00	5 0	..	..	80·38
8	15·00	5 45	74·43	..	..	..	..	..	..	..
„	15·34	4 0	..	..	50·06	..	..	..	..	..
13	14·50	9 45	..	..	129·09	..	..	..	..	..
14	14·67	9 45	..	137·78	..	12·00	5 0	..	80·73	..
„	..	..	..	..	..	12·34	5 0	..	..	78·17
15	14·34	6 0	81·24	..	..	..	..	..	..	..
„	15·34	4 0	..	..	50·06	..	..	..	..	..
21	21·25	5 45	..	56·09	..	..	..	..	..	..
22	16·34	5 0	59·42	..	..	..	..	..	..	..
„	16·00	5 0	..	..	59·99	..	..	..	..	..
27	15·83	9 45	..	..	118·24	..	..	..	..	..
28	15·50	9 45	..	130·40	..	12·34	5 0	..	78·51	..
„	..	..	..	..	..	12·50	5 0	..	..	77·17
29	15·50	5 0	62·64	..	..	..	..	..	..	..
„	14·67	4 0	..	..	52·34	..	..	..	..	..
Total -	(15·41)	103 30	323·04	457·59	583·25	(12·20)	29 45	77·35	159·24	235·72
Feb. 3	22·16	11 15	..	..	97·46	..	..	..	..	..
4	15·67	11 30	..	152·14	..	11·67	7 45	129·77	..	..
„	..	..	..	..	..	12·50	3 45	..	..	57·88
5	16·34	11 15	..	..	132·17	..	..	..	..	..
10	16·60	10 45	..	..	124·32	..	..	..	..	..
11	16·16	11 30	..	147·52	..	11·50	5 45	..	96·88	..
„	..	..	..	..	..	12·34	5 45	..	..	89·89
12	18·00	11 30	..	..	122·65	..	..	..	..	..
17	16·34	4 45	..	..	55·81	..	..	..	..	..
18	16·83	11 30	..	141·65	..	12·34	5 45	..	90·28	..
„	..	..	..	..	..	12·00	5 45	..	..	92·44
19	16·67	11 45	136·86	..	..	..	..	..	..	..
24	16·34	11 15	..	..	132·17	..	..	..	..	..
25	17·83	11 30	..	133·71	..	11·50	5 45	97·70	..	..
„	..	..	..	..	..	12·34	5 45	..	..	89·89
26	18·00	3 0	32·36	..	..	..	..	..	..	..
„	16·00	7 15	..	..	86·99	..	..	..	..	..
Total -	(17·03)	128 45	169·22	575·02	751·57	(11·98)	46 0	227·47	187·16	330·10
Mar. 3	16·00	11 15	..	..	134·98	..	..	..	..	..
4	18·00	11 30	..	132·44	..	12·00	5 45	..	92·84	..
„	..	..	..	..	..	11·34	5 45	..	..	97·82
5	16·34	6 45	80·21	..	..	..	..	..	..	..
„	17·34	3 45	..	..	41·52	..	..	..	..	..
17	(8 tanks*)	11 0	..	..	25·60	..	..	..	..	..
21	16·00	11 30	..	149·00	..	12·00	5 45	..	92·84	..
„	..	..	..	..	..	11·33	5 45	..	..	97·82
22	14·50	4 15	56·91	..	..	..	..	..	..	..
„	13·67	5 45	..	..	80·75	..	..	..	..	..
24	..	..	..	..	..	12·00	4 45	..	..	76·37
25	..	..	..	..	..	11·83	11 30	..	188·35	..
26	..	..	..	..	..	12·00	6 45	109·91	..	..
„	..	..	..	..	..	11·67	4 15	..	..	70·26
27	14·67	11 0	..	..	143·95	..	..	..	..	..
28	13·67	11 30	..	174·40	..	..	..	..	..	..
29	13·33	6 45	98·32	..	..	..	..	..	..	..
„	14·00	3 45	..	..	51·42	..	..	..	..	..
31	..	..	..	..	..	12·16	11·30	..	..	182·45
Total -	(16·73)	98 45	235·44	455·84	478·22	(11·85)	61 45	109·91	374·03	524·72

* When the *number of tanks* is given, the flow was too slow and irregular to estimate it by the average time taken to fill the gauge-tank, and therefore the actual number of tankfuls was counted.

Table I.—*continued.*

Detailed Record of the Sewage applied to Permanent Grass Land. Second Season 1861–2.

Dates.	Five-acre Field. Average Time taken to fill Gauge-tank (3·216 tons).	Five-acre Field. Time of application.	Five-acre Field. Sewage applied (calculated per acre). Plot 2. (Area ·99375 acre.)	Plot 3. (Area ·93081 acre.)	Plot 4. (Area 1·00512 acre.)	Ten-acre Field. Average Time taken to fill Gauge-tank (3·216 tons).	Ten-acre Field. Time of application.	Ten-acre Field. Sewage applied (calculated per acre). Plot 2. (Area ·9875 acre.)	Plot 3. (Area ·99583 acre.)	Plot 2. (Area 1·00019 acre.)
	Mins.	H. M.	Tons.	Tons.	Tons.	Mins.	H. M.	Tons.	Tons.	Tons.
April 1	..	..	..	..	..	11·50	11 30	..	193·76	..
2	..	..	..	..	..	12·33	6 45	106·97	..	..
,,	..	..	..	..	..	11·33	4 15	..	..	72·37
3	15·16	11 30	..	..	145·63	..	..	..	..	..
4	15·50	11 30	..	153·80	..	..	..	..	..	..
5	15·67	6 45	83·64	..	..	..	..	..	..	..
,,	15·00	2 45	..	..	35·20	..	..	..	..	..
7	..	..	..	..	..	11·80	10 15	..	..	167·58
8	..	..	..	..	..	12·16	11 30	..	183·24	..
9	..	..	..	..	..	12·33	5 45	91·12	..	..
,,	..	..	..	..	..	11·50	3 45	..	..	62·91
10	15·20	10 15	..	..	129·46	..	..	..	..	..
11	14·75	7 45	..	108·92	..	..	..	..	..	..
12	15·67	10 15	..	..	125·58	..	..	..	..	..
14	..	..	..	..	..	12·33	10 30	..	..	164·29
15	..	..	..	..	..	12·33	11 30	..	180·71	..
16	..	..	..	..	..	12·33	6 45	106·97	..	..
,,	..	..	..	..	..	11·67	4 30	..	..	74·39
17	17·60	10 0	..	..	109·08	..	..	..	..	..
19	15·67	4 0	49·56	..	..	..	..	..	..	..
,,	15·33	6 45	..	91·28	..	..	..	..	..	..
21	..	..	..	..	..	12·16	10 30	..	..	166·59
22	..	..	..	..	..	12·33	11 30	..	180·71	..
23	..	..	..	..	..	12·33	6 45	106·97	..	..
,,	..	..	..	..	..	11·50	3 30	..	..	58·71
24	16·00	11 0	..	..	131·98	..	..	..	..	..
25	16·00	11 30	..	149·00	..	..	..	..	..	..
26	16·67	6 45	78·62	..	..	..	..	..	..	..
,,	16·67	3 45	..	..	43·19	..	..	..	..	..
28	..	..	..	..	..	12·67	4 45	..	..	72·33
29	..	..	..	..	..	13·50	11 30	..	165·05	..
30	..	..	..	..	..	13·67	6 45	96·49	..	..
,,	..	..	..	..	..	13·00	2 30	..	..	37·10
Total -	(15·75)	114 30	211·82	503·00	720·12	(12·26)	144 45	508·52	903·47	876·27
May 1	17·67	4 45	..	..	51·61	..	..	..	..	..
2	20·67	4 45	44·62	..	..	..	..	..	..	..
,,	21·00	6 45	..	66·63	..	..	..	..	..	..
3	20·67	10 30	..	..	97·52	..	..	..	..	..
5	..	..	..	..	..	13·16	10 30	..	..	153·93
6	..	..	..	..	..	13·50	4 30	..	64·59	..
,,	..	..	..	..	..	13·67	5 45	..	..	81·15
7	..	..	..	..	..	13·33	5 45	84·29	..	..
,,	..	..	..	..	..	13·33	5 0	..	..	72·36
8	25·67	11 30	..	..	86·00	..	..	..	..	..
9	25·67	11 30	..	92·87	..	..	..	..	..	..
10	25·00	6 15	48·54	..	..	..	..	..	..	..
,,	23·33	4 15	..	..	34·97	..	..	..	..	..
12	..	..	..	..	..	15·40	8 45	..	..	109·62
13	..	..	..	..	..	14·67	5 45	..	75·94	..
,,	..	..	..	..	..	17·00	6 0	..	..	68·09
14	..	..	..	..	..	16·00	4 45	58·01	..	..
,,	..	..	..	..	..	12·67	6 45	..	..	102·78
15	24·50	11 30	..	..	90·11	..	..	..	..	..
16	16·00	11 30	..	149·00	..	..	..	..	..	..
17	15·50	4 0	50·11	..	..	..	..	..	..	..
,,	16·00	6 45	..	..	80·99	..	..	..	..	..
19	..	..	..	..	..	11·83	10 30	..	..	171·23
20	..	..	..	..	..	12·67	5 45	..	87·93	..
,,	..	..	..	..	..	13·33	5 45	..	..	83·22
21	..	..	..	..	..	11·50	3 0	59·97	..	..
,,	..	..	..	..	..	12·33	5 45	..	..	89·97
22	19·00	11 30	..	..	116·20	..	..	..	..	..
23	16·83	11 30	..	141·65	..	..	..	..	..	..
24	17·00	5 45	65·68	..	..	..	..	..	..	..
,,	17·00	4 45	..	..	53·64	..	..	..	..	..
26	..	..	..	..	..	11·83	10 30	..	..	171·23
27	..	..	..	..	..	11·33	11 30	..	196·67	..
28	..	..	..	..	..	11·67	5 45	96·28	..	..
,,	..	..	..	..	..	11·33	5 45	..	..	97·91
29	20·00	11 30	..	..	110·39	..	..	..	..	..
30	18·17	11 30	..	131·20	..	..	..	..	..	..
31	18·00	6 45	72·82	..	..	..	..	..	..	..
,,	17·33	3 45	..	..	41·54	..	..	..	..	..
Total -	(19·56)	161 0	281·77	581·35	762·97	(12·90)	127 45	289·55	425·13	1201·49

Table I.—*continued.*

Detailed Record of the Sewage applied to Permanent Grass Land. Second Season 1861–2.

Dates.	Five-acre Field.					Ten-acre Field.				
	Average time taken to fill Gauge-tank (3·216 tons).	Time of application.	Sewage applied (calculated per acre). Plot 2. (Area ·99375 acre.)	Plot 3. (Area ·93081 acre.)	Plot 4. (Area 1·00512 acre.)	Average time taken to fill Gauge-tank (3·216 tons).	Time of application.	Sewage applied (calculated per acre). Plot 2. (Area ·9875 acre.)	Plot 3. (Area ·99588 acre.)	Plot 4. (Area 1·00019 acre.)
	Mins.	H. M.	Tons.	Tons.	Tons.	Mins.	H. M.	Tons.	Tons.	Tons.
June 2	..	..	..	..	..	13·00	4 45	..	..	70·49
3	..	..	..	..	..	12·00	7 45	..	125·14	..
„	..	..	..	..	..	12·00	3 45	..	..	60·29
4	..	..	..	..	..	13·33	5 45	84·29	..	..
„	..	..	..	..	..	13·00	5 45	..	..	85·33
5	18·80	11 30	..	..	117·43	..	..	..	..	..
6	16·83	11 30	..	141·65	..	..	..	..	..	..
7	17·00	6 45	77·10	..	..	..	..	..	..	..
„	16·33	3 45	..	..	44·09	..	..	..	..	..
9	..	..	..	..	..	10·50	4 0	..	73·81	..
„	..	..	..	..	..	12·00	6 45	..	..	108·52
10	..	..	..	..	..	14·00	9 15	..	128·02	..
11	..	..	..	..	..	12·67	5 45	88·68	..	..
„	..	..	..	..	..	13·00	5 45	..	..	85·33
12	16·83	11 30	..	..	131·18	..	..	..	..	..
13	18·00	2 0	..	23·03	..	..	..	..	..	..
Total -	(17·30)	47 0	77·10	164·68	292·70	(12·61)	59 15	172·97	326·97	409·96
July 5	36·50	4 0	..	..	21·04	17·75	7 0	..	..	76·06
7	..	..	..	..	..	14·00	11 0	..	..	151·58
8	..	..	..	..	..	11·33	11 0	..	188·11	..
9	..	..	..	..	..	11·17	12 0	209·92	..	..
10	16·00	12 0	..	..	143·98	12·00	12 0	..	..	192·92
11	16·50	12 0	..	150·77	..	12·00	12 0	..	193·76	..
12	15·67	11 0	136·30	..	..	11·83	11 0	..	..	179·39
14	15·67	11 0	..	..	134·76	11·67	11 0	..	..	181·85
15	15·59	12 0	..	160·49	..	11·67	12 0	..	199·24	..
16	15·50	12 0	150·33	..	..	12·33	12 0	190·17	..	..
17	16·16	12 0	..	..	142·56	13·50	12 0	..	..	171·49
18	15·60	11 0	..	146·17	..	11·60	11 0	..	183·74	..
19	15·33	11 0	..	..	137·75	11·67	11 0	..	..	181·85
21	14·83	11 0	..	..	142·40	11·67	11 0	..	..	181·85
22	15·50	4 45	..	63·53	..	11·00	4 45	..	83·67	..
23	16·33	12 0	142·69	..	..	11·33	12 0	..	205·22	..
24	15·50	12 0	..	..	148·63	12·00	12 0	195·40	..	..
25	15·50	12 0	..	160·49	..	11·50	12 0	..	..	201·31
26	14·17	11 0	150·73	..	..	12 50	5 0	..	..	77·17
28	15·33	11 0	..	..	137·75	12·00	2 0	..	..	32·15
29	15·00	11 30	..	158·93	..	11·60	12 0	..	..	199·58
30	14·67	12 0	..	..	157·04	11·50	12 0	..	202·18	..
31	14·60	12 0	..	..	157·79	12·20	12 0	..	..	189·76
Total -	(15·59)	217 15	580·05	840·38	1323·70	(12·00)	239 45	595·49	1255·92	2016·98
Aug. 1	14·67	12 0	..	..	157·04	11·40	12 0	..	203·96	..
2	14·67	11 0	..	..	143·95	11·25	11 0	..	..	188·64
4	14·67	11 0	..	..	143·95	11·60	11 0	..	..	182·94
5	14·67	12 0	..	..	157·04	11·60	12 0	..	200·44	..
6	15·33	12 0	151·99	..	..	11·60	12 0	..	..	199·58
7	15·00	12 0	..	..	153·58	11·60	12 0	202·14	..	..
8	15·17	12 0	..	..	151·86	11·60	12 0	..	200·44	..
9	15·33	11 0	..	148·75	..	11·80	11 0	..	..	179·84
11	..	..	..	..	..	11·00	5 0	..	..	87·69
12	..	..	..	..	..	12·00	12 0	..	193·76	..
13	..	..	..	..	..	11·60	11 30	..	..	191·26
14	15·33	12 0	..	..	150·28	..	..	..	..	..
15	15·33	12 0	..	162·27	..	..	..	..	..	..
16	15·00	7 30	..	..	95·99	..	..	..	..	..
18	..	..	..	..	..	12·40	11 0	..	..	171·14
19	..	..	..	..	..	11·50	12 0	..	202·18	..
20	15·00	12 0	..	..	153·58	..	..	..	..	..
21	15·00	12 0	..	165·81	..	..	..	..	..	..
25	15·67	11 0	..	..	131·76	11·50	11 0	..	..	184·53
26	14·83	12 0	157·12	..	..	12·00	12 0	195·40	..	.
Total -	(15·04)	171 30	309·11	476·86	1142·03	(11·65)	167 30	397·54	1000·78	1885·62

Table I.—*continued.*

Detailed Record of the Sewage applied to Permanent Grass Land. Second Season 1861–2.

Dates.	Five-acre Field.					Ten-acre Field.				
	Average time taken to fill Gauge-tank (3·216 tons).	Time of application.	Sewage applied (calculated per acre).			Average time taken to fill Gauge-tank (3·216 tons).	Time of application.	Sewage applied (calculated per acre).		
			Plot 2. (Area ·99375 acre.)	Plot 3. (Area ·93081 acre.)	Plot 4. (Area 1·00512 acre.)			Plot 2. (Area ·9875 acre.)	Plot 3. (Area ·99588 acre.)	Plot 4. (Area 1·00013 acre.)
	Mins.	H. M.	Tons.	Tons.	Tons.	Mins.	H. M.	Tons.	Tons.	Tons.
Sept. 1	14·83	11 0	..	..	142·40	11·50	11 0	..	..	184·53
2	14·83	12 0	..	167·74	..	11·33	12 0	..	205·22	..
8	15·50	11 0	..	..	136·24	..	..	..	..	..
9	15·33	12 0	..	162·27	..	..	..	..	..	..
15	15·67	11 0	..	..	134·76	11·67	11 0	..	..	181·85
16	14·67	6 0	79·42	..	..	12·17	12 0	..	191·05	..
„	15·00	6 0	..	82·92	..	..	..	..	..	..
22	17·00	3 0	..	..	33·88	12·50	3 0	..	..	46·30
23	16·33	6 0	..	76·17	..	13·20	12 0	177·64	..	..
„	18·33	6 0	..	..	62·84	..	..	..	..	..
29	17·83	11 0	..	..	118·44	12·20	11 0	..	..	173·95
30	18·50	12 0	..	134·47	..	12·17	12 0	..	..	190·23
Total -	(15·99)	107 0	79·42	623·57	628·56	(12·03)	84 0	177·64	396·27	776·86
Oct. 6	24·60	11 0	..	..	85·84	23·40	11 0	..	..	90·69
7	28·67	12 0	..	86·77	..	26·20	12 0	..	88·74	..
13	16·00	11 0	..	..	131·98	11·50	11 0	..	..	184·54
14	16·00	6 0	72·82	..	..	11·16	12 0	..	208·34	..
„	16·33	6 0	..	76·17	..	..	..	..	..	..
20	..	..	..	..	..	12·33	11 0	..	..	172·11
21	.	..	..	..	..	12·67	11 0	..	168·22	..
22	..	..	..	..	..	12·50	11 0	171·95	..	..
23	15·33	11 0	..	..	137·75	..	..	..	..	..
24	15·25	8 0	..	108·75	..	..	..	..	..	..
25	16·00	11 0	..	..	131·98	..	..	..	..	..
27	..	..	..	..	..	12·33	5 15	83·20	..	..
„	..	..	..	..	..	12·00	1 15	..	20·18	..
„	..	..	..	..	..	12·33	4 30	..	..	70·41
28	16·00	11 0	..	..	131·98	..	..	..	..	..
29	16·25	9 0	..	114·81	..	..	..	..	..	..
„	16·50	3 0	..	..	34·90	..	..	..	..	..
30	16·00	12 0	145·63	..	..	..	..	..	..	..
31	16·00	5 30	66·75	..	..	..	..	..	..	..
„	16·33	6 30	..	..	76·42	..	..	..	..	..
Total -	(17·23)	123 0	285·20	386·50	730·85	(13·86)	90 0	255·15	485·48	517·75

Table II.

Detailed Record of the Sewage applied to Permanent Grass Land. Third Season 1862–3.

Dates.	Five-acre Field. Average time taken to fill Gauge-tank (3·216 tons).	Time of application.	Sewage applied (calculated per acre). Plot 2. (Area ·99375 acre.)	Plot 3. (Area ·93081 acre.)	Plot 4. (Area 1·00512 acre.)	Ten-acre Field. Average time taken to fill Gauge-tank (3·216 tons).	Time of application.	Sewage applied (calculated per acre). Plot 2. (Area ·9875 acre.)	Plot 3. (Area ·99588 acre.)	Plot 4. (Area 1·00019 acre.)
	Mins.	H. M.	Tons.	Tons.	Tons.	Mins.	H. M.	Tons.	Tons.	Tons.
Nov. 1	17·00	11 0	..	..	124·22	..	..	..	..	..
3	..	..	..	..	..	12·67	4 0	..	..	60·91
4	..	..	..	..	..	12·50	10 0	..	155·01	..
5	..	..	..	..	..	12·83	10 0	..	..	150·37
6	16·67	10 0	..	..	115·16	..	..	..	..	..
7	16·33	10 0	..	126·95	..	..	..	..	..	..
8	15·83	10 0	..	..	121·27	..	..	..	..	..
10	..	..	..	..	..	13·50	10 0	..	..	142·91
11	..	..	..	..	..	12·67	10 0	..	152·93	..
12	..	..	..	..	..	13·00	10 0	150·31	..	..
13	16·83	10 0	..	..	114·07	..	..	..	..	..
14	16·00	10 0	..	129·56	..	..	..	..	..	..
15	16·25	7 30	89·62	..	..	..	..	..	..	..
17	..	..	..	..	..	12·60	9 30	..	..	145·46
18	..	..	..	..	..	13·00	10 0	..	149·05	..
19	..	..	..	..	..	12·50	10 0	..	..	154·34
20	17·00	10 0	..	..	112·93	..	..	..	..	..
21	16·33	10 0	..	126·95	..	..	..	..	..	..
22	15·40	9 0	..	..	112·19	..	..	..	..	..
24	..	..	..	..	..	12·33	7 30	..	..	117·35
25	..	..	..	..	..	12·40	9 0	..	140·63	..
26	..	..	..	..	..	12·40	8 45	137·88	..	..
27	16·60	9 15	..	..	106·98	..	..	..	..	..
28	16·00	10 0	..	129·56	..	..	..	..	..	..
29	16·00	9 15	112·26	..	..	..	..	..	..	..
Total -	(16·33)	126 0	201·88	513·02	806·82	(12·71)	108 45	288·19	597·62	771·34
Dec. 1	..	..	..	..	..	12·50	10 0	..	..	154·34
2	..	..	..	..	..	12·50	10 0	..	155·01	..
3	..	..	..	..	..	12·10	9 0	..	..	140·03
4	16·67	10 0	..	..	115·16	..	..	..	..	..
5	16·50	10 0	..	125·64	..	..	..	..	..	..
6	16·67	10 0	..	..	115·16	..	..	..	..	..
9	..	..	..	..	..	12·40	8 0	..	..	124·47
10	..	..	..	..	..	12·40	9 0	..	140·63	..
11	18·00	6 0	..	..	63·99	..	..	..	..	..
12	17·00	6 45	..	82·31	..	..	..	..	..	..
13	17·00	10 0	114·22	..	..	..	..	..	..	..
15	..	..	..	..	..	12·00	10 0	..	..	160·77
16	..	..	..	..	..	11·67	10 0	..	166·03	..
17	..	..	..	..	..	11·60	9 0	151·61	..	..
18	17·00	10 0	..	..	112·93	..	..	..	..	..
19	19·33	10 0	..	107·24	..	..	..	..	..	..
20	18·60	9 0	..	..	92·89	..	..	..	..	..
22	..	..	..	..	..	11·67	10 0	..	..	165·32
23	..	..	..	..	..	11·83	10 0	..	163·79	..
24	..	..	..	..	..	11·60	9 0	..	..	149·68
Total -	(17·34)	81 45	114·22	315·19	500·13	(12·04)	104 0	151·61	625·46	894·61
Jan. 5	..	..	..	..	..	11·67	10 0	..	..	165·32
6	..	..	..	..	..	12·00	10 0	162·84	..	..
7	..	..	..	..	..	11·40	9 0	..	..	152·31
8	17·33	10 0	112·04	..	..	..	..	..	..	..
9	16·33	10 0	..	..	117·56	..	..	..	..	..
10	16·67	10 0	116·48	..	..	..	..	..	..	..
12	..	..	..	..	..	11·83	10 0	..	..	163·08
13	..	..	..	..	..	11·67	10 0	..	166·03	..
14	..	..	..	..	..	11·67	10 0	..	..	165·32
15	17·83	10 0	..	..	107·67	..	..	..	..	..
16	16·80	9 0	..	111·06	..	..	..	..	..	..
17	16·17	10 0	..	..	118·72	..	..	..	..	..
19	..	..	..	..	..	12·00	2 30	..	..	40·19
20	..	..	..	..	..	12·00	10 0	..	161·47	..
21	..	..	..	..	..	11·83	10 0	165·18	..	..
22	16·33	10 0	..	..	117·56	..	..	..	..	..
23	16·00	10 0	..	129·56	..	..	..	..	..	..
24	15·83	10 0	122·66	..	..	..	..	..	..	..
26	..	..	..	..	..	11·83	10 0	..	..	163·08
27	..	..	..	..	..	12·50	7 0	..	108·50	..
28	..	..	..	..	..	11·80	10 0	165·60	..	..
29	16·67	10 0	..	124·36	..	..	..	..	..	..
30	16·17	10 0	..	..	118·72	..	..	..	..	..
31	16·67	10 0	..	124·36	..	..	..	..	..	..
Total	(16·55)	119 0	351·18	489·34	580·23	(11·82)	108 30	493·62	436·00	849·30

Table II.—*continued.*

Detailed Record of the Sewage applied to Permanent Grass Land. Third Season 1862–3.

Dates.	Five-acre Field. Average time taken to fill Gauge-tank (3·216 tons).	Five-acre Field. Time of application.	Five-acre Field. Sewage applied (calculated per acre). Plot 2. (Area ·99375 acre.)	Five-acre Field. Sewage applied (calculated per acre). Plot 3. (Area ·93081 acre.)	Five-acre Field. Sewage applied (calculated per acre). Plot 4. (Area 1·00512 acre.)	Ten-acre Field. Average time taken to fill Gauge-tank (3·216 tons).	Ten-acre Field. Time of application.	Ten-acre Field. Sewage applied (calculated per acre). Plot 2. (Area ·9875 acre.)	Ten-acre Field. Sewage applied (calculated per acre). Plot 3. (Area ·99588 acre.)	Ten-acre Field. Sewage applied (calculated per acre). Plot 4. (Area 1·00019 acre.)
	Mins.	H. M.	Tons.	Tons.	Tons.	Mins.	H. M.	Tons.	Tons.	Tons.
Feb. 2	..	..	..	..	..	12·00	7 15	..	..	116·56
3	..	..	..	..	..	11·67	10 0	..	166·03	..
4	..	..	..	..	..	11·83	10 0	..	..	163·08
5	20·50	10 0	..	..	93·65	..	..	..	..	..
6	22·33	10 0	..	92·84	..	..	..	..	..	..
7	23·00	9 0	..	..	75·12	..	..	..	..	..
9	..	..	..	..	..	11·60	11 0	..	..	182·94
10	..	..	..	..	..	11·67	11 0	..	182·63	..
11	..	..	..	..	..	11·67	11 0	..	..	181·85
12	26·00	11 0	..	..	81·22	..	..	..	..	..
13	26·50	11 0	..	86·05	..	..	..	..	..	..
14	26·50	10 0	73·27	..	..	..	..	..	..	..
16	..	..	..	..	..	11·67	11 0	..	..	181·85
17	..	..	..	..	..	11·50	12 0	..	202·18	..
18	..	..	..	..	..	11·67	12 0	200·93	..	..
19	29·00	12 0	..	..	79·44	..	..	..	..	..
20	27·67	12 0	..	89·90	..	..	..	..	..	..
21	26·17	11 0	..	..	80·69	..	..	..	..	..
23	..	..	..	..	..	11·33	11 0	..	..	187·30
24	20·50	12 0	..	..	112·38	..	..	..	..	..
25	17·67	12 0	..	140·78	..	..	..	..	..	..
26	16·80	10 30	121·36	..	..	..	..	..	..	..
27	17·33	12 0	..	..	132·93	..	..	..	..	..
28	16·17	11 0	..	141·02	..	..	..	..	..	..
Total -	(21·70)	153 30	194·63	550·59	655·43	(11·64)	106 15	200·93	550·84	1013·58
Mar. 2	16·67	11 0	..	..	126·68	..	..	..	..	..
3	..	..	..	..	..	11·50	12 0	..	202·18	..
4	15·67	12 0	..	..	147·02	..	..	..	..	..
5	15·60	9 0	..	119·60	..	..	..	..	..	..
6	15·83	12 0	147·19	..	..	..	..	..	..	..
7	15·17	11 0	..	..	139·20	..	..	..	..	..
9	15·50	3 0	..	..	37·16	..	..	..	..	..
11	20·83	12 0	..	119·43	..	..	..	..	..	..
12	14·33	7 0	..	..	93·78	..	..	..	..	..
13	..	..	..	..	..	11·50	12 0	..	..	201·31
14	15·00	11 0	..	..	140·78	..	..	..	..	..
16	14·17	11 0	..	..	149·03	..	..	..	..	..
17	..	..	..	..	..	11·50	12 0	203·90	..	..
18	14·00	12 0	..	177·69	..	..	..	..	..	..
19	13·33	12 0	174·80	..	..	..	..	..	..	..
20	13·50	12 0	..	..	170·65	..	..	..	..	..
21	13·33	11 0	..	171·07	..	..	..	..	..	..
23	13·17	11 0	..	..	160·35	..	..	..	..	..
24	..	..	..	..	..	11·83	12 0	..	..	195·70
25	13·33	12 0	..	186·62	..	..	..	..	..	..
27	14·50	12 0	160·70	..	..	..	..	..	..	..
28	13·67	10 30	..	..	147·46	..	..	..	..	..
30	33·17	11 0	..	..	63·66	..	..	..	..	..
31	..	..	..	..	..	12·33	12 0	..	188·57	..
Total -	(15·13)	202 30	482·69	774·41	1375·77	(11·72)	60 0	203·90	390·75	397·01
April 1	15·83	12 0	..	157·15	..	..	..	..	..	..
2	15·50	12 0	..	..	148·63	..	..	..	..	..
6	16·33	11 0	..	..	129·32	..	..	..	..	..
7	..	..	..	..	..	11·67	12 0	..	..	198·38
8	16·17	12 0	..	153·84	..	..	..	..	..	..
9	16·67	12 0	139·78	..	..	..	..	..	..	..
16	..	..	..	..	..	..	..	..	..	..
17	..	..	..	..	..	11·67	12 0	..	199·24	..
20	17·83	11 0	..	..	118·44	11·83	12 0	..	..	195·70
21	17·40	10 30	..	125·10	..	..	..	..	..	..
22	17·17	12 0	..	..	134·17	..	..	..	..	..
23	..	..	..	..	..	..	..	..	..	..
24	..	..	..	..	..	11·50	12 0	203·90	..	..
27	18·33	10 30	..	..	109·97	11·67	12 0	..	..	198·38
28	21·67	12 0	..	114·80	..	..	..	..	..	..
29	21·67	12 0	94·45	..	..	..	..	..	..	..
30	..	..	..	..	..	11·83	12 0	..	196·54	..
Total -	(17·64)	127 0	234·23	550·89	640·53	(11·69)	72 0	203·90	395·78	592·46

Table II.—*continued.*

Detailed Record of the Sewage applied to Permanent Grass Land. Third Season 1862–3.

Dates.	Five-acre Field. Average time taken to fill Gauge-tank (3·216 tons).	Five-acre Field. Time of application.	Five-acre Field. Sewage applied (calculated per acre). Plot 2. (Area ·99375 acre.)	Five-acre Field. Sewage applied (calculated per acre). Plot 3. (Area ·93081 acre.)	Five-acre Field. Sewage applied (calculated per acre). Plot 4. (Area 1·00512 acre.)	Ten-acre Field. Average time taken to fill Gauge-tank (3·216 tons).	Ten-acre Field. Time of application.	Ten-acre Field. Sewage applied (calculated per acre). Plot 2. (Area ·9875 acre.)	Ten-acre Field. Sewage applied (calculated per acre). Plot 3. (Area ·99583 acre.)	Ten-acre Field. Sewage applied (calculated per acre). Plot 4. (Area 1·00019 acre.)
	Mins.	H. M.	Tons.	Tons.	Tons.	Mins.	H. M.	Tons.	Tons.	Tons.
May 1	..	..	..	..	..	11·83	12 0	..	..	195·70
4	28·80	10 30	..	..	69·99	..	..	..	..	..
5	28·83	11 15	..	80·89	..	..	..	..	..	..
6	27·67	12 0	..	..	83·26	..	..	..	..	..
7	..	..	..	..	..	11·67	12 0	..	..	193·38
8	..	..	..	..	..	11·67	12 0	..	199·24	..
12	35·33	11 15	..	..	61·13	..	..	..	..	..
13	24·17	11 15	90·38	.	..	..	..	..	..	..
14	..	..	..	..	..	11·80	9 30	..	..	155·32
15	..	..	..	..	..	13·50	2 45	39·81	..	..
18	16·67	5 0	..	62·18	..	..	..	..	..	..
19	16·50	12 0	..	..	139·62	..	..	..	..	..
20	16·33	12 0	..	152·34	..	..	..	..	..	..
27	16·33	5 0	..	..	58·78	..	..	..	..	..
28	16·67	12 0	..	149·23	..	11·33	12 0	..	205·22	..
29	16·17	12 0	..	..	142·47	12·00	12 0	..	..	192·92
30	16·17	10 30	..	134·61	..	11·40	10 30	..	178·46	..
Total -	(20·28)	124 45	90·38	579·25	555·25	(11·72)	82 45	39·81	582·92	742·32
June 1	16·00	11 0	..	..	131·98	12·00	11 0	..	177·61	..
2	16·50	12 0	..	150·77	..	11·83	12 0	..	..	195·70
3	20·00	12 0	..	..	115·19	11·67	12 0	..	199·24	..
4	21·17	12 0	110·07	..	..	11·67	12 0	..	..	198·38
5	23·00	12 0	..	..	100·16	11·50	12 0	..	202·18	..
6	17·20	10 30	118·54	..	..	12·17	10 30	..	..	166·45
8	16·25	9 45	..	..	115·19	..	..	..	..	..
9	17·80	12 0	..	139·76	..	..	..	..	..	..
10	15·50	12 0	150·33	..	..	..	..	..	..	..
11	..	..	..	..	..	11·83	12 0	..	196·54	..
12	..	..	..	..	..	12·00	12 0	..	..	192·92
15	17·00	9 45	111·36	..	..	..	..	..	..	..
16	16·83	12 0	..	147·81	..	..	..	..	..	..
17	17·00	12 0	137·06	..	..	..	..	..	..	..
18	..	..	..	..	..	11·67	12 0	..	199·24	..
19	..	..	..	..	..	11·83	11 30	189·95	..	..
22	16·00	11 0	133·49	..	..	..	..	..	..	..
23	15·67	7 45	..	102·53	..	..	..	..	..	..
24	17·17	12 0	135·71	..	..	..	..	..	..	..
25	..	..	..	..	..	12·00	12 0	195·40	..	..
26	..	..	..	..	..	11·83	12 0	..	..	195·70
Total -	(17·41)	167 45	896·56	540·87	462·52	(11·83)	141 0	385·35	974·81	949·15
July 1	19·17	12 0	..	..	120·17	..	..	..	..	..
2	..	..	..	..	..	12·00	12 0	..	..	192·92
3	..	..	..	..	..	12·20	11 0	176·18	..	..
6	17·67	10 30	..	..	114·08	..	..	..	..	..
7	..	..	..	..	..	12·33	11 30	182·25	..	..
8	17·17	11 30	..	..	128·58	..	..	..	..	..
9	..	..	..	..	..	11·75	8 45	..	..	143·67
10	16·40	9 45	..	..	114·13	..	..	..	..	..
13	17·67	10 30	..	..	114·08	..	..	..	..	..
14	17·33	11 30	..	137·56	..	..	..	..	..	..
15	18·00	9 0	..	..	95·99	..	..	..	..	..
16	..	..	..	..	..	11·25	8 0	..	..	137·19
17	..	..	..	..	..	12·25	8 0	..	..	125·99
20	16·17	11 0	..	141·02	..	..	..	..	..	..
21	17·80	9 15	100·90	..	..	..	..	..	..	..
22	16·83	12 0	..	147·81	..	..	..	..	..	..
23	..	..	..	..	..	12·33	12 0	..	188·57	..
24	..	..	..	..	..	11·80	11 0	..	..	179·84
27	17·50	10 15	..	..	112·44	..	..	..	..	..
28	17·80	10 30	..	..	113·25	..	..	..	..	..
29	17·67	6 15	..	..	67·90	..	..	..	..	..
30	..	..	..	..	..	12·40	10 0	..	156·26	..
31	..	..	..	..	..	11·67	8 0	133·95	..	..
Total -	(17·41)	134 0	100·90	426·39	980·62	(12·02)	100 15	492·38	344·83	779·61

Table II.—*continued.*

Detailed Record of the Sewage applied to Permanent Grass Land. Third Season 1862–3.

Dates.	Five-acre Field.					Ten-acre Field.				
	Average time taken to fill Gauge-tank (3·216 tons).	Time of application.	Sewage applied (calculated per acre).			Average time taken to fill Gauge-tank (3·216 tons).	Time of application.	Sewage applied (calculated per acre).		
			Plot 2. (Area ·99375 acre.)	Plot 3. (Area ·93081 acre.)	Plot 4. (Area 1·00512 acre.)			Plot 2. (Area ·9875 acre.)	Plot 3. (Acre ·99588 acre.)	Plot 4. (Area 1·00019 acre.)
	Mins.	H. M.	Tons.	Tons.	Tons.	Mins.	H. M.	Tons.	Tons.	Tons.
Aug. 3	16·00	2 30	..	..	30·00	..	..	..	..	..
4	16·00	12 0	..	..	143·98	..	..	..	..	..
5	17·17	12 0	..	144·88	..	..	..	..	..	..
6	..	..	..	..	..	13·00	12 0	..	..	178·08
7	..	..	..	..	..	14·00	10 45	150·04	..	..
10	16·00	10 0	..	..	119·99	..	..	..	..	..
11	17·33	12 0	..	143·55	..	..	..	..	..	..
12	19·67	7 0	..	..	68·32	..	..	..	..	..
17	16·33	11 0	..	..	129·32	..	..	..	..	..
18	18·40	10 45	..	121·12	..	..	..	..	..	..
19	23·00	1 30	..	..	12·52	..	..	..	..	..
20	..	..	..	..	..	12·33	11 0	..	..	172·11
21	..	..	..	..	..	12·40	11 0	..	..	171·14
24	15·40	10 0	..	..	124·66	..	..	..	..	..
25	15·50	8 0	..	..	99·09	..	..	..	..	..
26	18·50	12 0	..	..	124·53	..	..	..	..	..
27	..	..	..	..	..	11·83	12 0	..	..	195·70
31	17·60	10 15	..	..	111·81	..	..	..	..	..
Total -	(17·00)	119 0	..	409·55	964·22	(12·65)	56 45	150·04	..	717·03
Sept. 1	15·83	12 0	..	157·15	..	..	..	..	..	..
2	18·33	12 0	..	..	125·68	..	..	..	..	..
3	..	..	..	..	..	13·40	10 15	..	..	147·57
4	..	..	..	..	..	12·50	12 0	..	186·01	..
7	17·50	11 0	..	..	120·67	..	..	..	..	..
8	16·50	11 30	..	144·48	..	..	..	..	..	..
9	17·00	12 0	..	..	135·51	..	..	..	..	..
10	..	..	..	..	..	12·00	9 0	..	145·32	..
11	..	..	..	..	..	13·50	7 0	..	..	100·03
15	16·00	12 0	145·63	..	..	..	..	..	..	..
16	16·75	8 15	..	102·11	..	..	..	..	..	..
17	..	..	..	..	..	13·00	7 30	..	..	111·30
18	..	..	..	..	..	12·80	9 15	..	140·02	..
21	19·00	11 0	..	..	111·15	..	..	..	..	..
22	17·40	10 30	..	125·10	..	..	..	..	..	..
23	18·75	8 0	..	88·45	..	..	..	..	..	..
24	..	..	..	..	..	12·75	9 0	..	..	136·18
25	..	..	..	..	..	12·00	10 30	..	169·54	..
28	17·83	11 0	..	..	118·44	..	..	..	..	..
29	18·00	12 0	129·45	..	..	..	..	..	..	..
30	19·67	5 0	..	..	48·80	..	..	..	..	..
Total -	(17·39)	136 15	275·08	617·29	660·25	(12·68)	74 30	..	640·89	495·08
Oct. 1	..	..	..	..	..	12·33	12 0	..	..	187·76
2	..	..	..	..	..	13·50	8 0	115·79	..	..
5	16·50	6 30	..	81·67	..	..	..	..	..	..
,,	16·50	4 30	..	..	52·36	..	..	..	..	..
6	18·00	9 30	..	..	101·32	..	..	..	..	..
7	19·25	8 45	..	..	87·26	..	..	..	..	..
8	..	..	..	..	..	11·80	10 30	..	..	171·67
9	..	..	..	..	..	12·33	12 0	..	188·57	..
12	17·67	11 0	..	..	119·51	..	..	..	..	..
13	16·83	12 0	..	..	136·88	..	..	..	..	..
14	17·67	12 0	..	140·78	..	..	..	..	..	..
15	..	..	..	..	..	13·00	12 0	..	..	178·08
16	..	..	..	..	..	12·00	12 0	..	193·76	..
17	..	..	..	..	..	12·50	11 0	171·95	..	..
19	17·00	5 0	57·11	..	..	..	..	..	..	..
,,	18·00	6 0	..	..	63·99	..	..	..	..	..
20	17·17	12 0	..	..	134·17	..	..	..	..	..
21	17·33	6 0	..	..	66·47	12·00	2 45	..	..	44·21
22	..	..	..	..	..	14·20	8 45	..	..	118·88
23	..	..	..	..	..	13·67	6 0	85·77	..	..
,,	..	..	..	..	..	15·00	6 0	..	77·50	..
24	20·00	1 0	..	10·37	..	11·00	1 0	17·76	..	..
,,	16·00	4 45	..	..	56·99	14·00	7 0	..	..	96·46
Total -	(17·42)	99 0	57·11	232·82	818·95	(12·81)	109 0	391·27	459·83	797·06

Table III.

Detailed Record of the Amounts of Green Produce obtained in the Experiments on Permanent Grass Land.

Second Season 1862.

Dates of Cuttings.	Green Grass obtained (calculated per acre).							
	Five-acre Field.				Ten-acre Field.			
	Without Sewage.	With Sewage.			Without Sewage.	With Sewage.		
	Plot 1.*	Plot 2.	Plot 3.	Plot 4.	Plot 1.*	Plot 2.	Plot 3.	Plot 4.
	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.
		1st Crop.	1st Crop.	1st Crop.	1st Crop.	1st Crop.	1st Crop.	1st Crop.
May 1	..	..	..	..	..	..	..	0 13 2 0
2	..	..	..	..	..	..	..	0 13 0 0
3	..	..	..	..	..	..	..	1 2 0 0
5	..	..	..	..	..	..	..	0 17 2 0
6	..	..	..	..	..	..	..	0 17 3 0
7	..	..	..	..	..	..	0 16 0 21	..
8	..	..	..	0 8 0 15	..	..	0 13 2 6	..
9	..	..	..	0 8 2 14	..	..	1 0 2 9	..
10	..	..	..	1 3 1 15	..	..	1 18 2 24	..
12	..	..	..	0 13 1 22	..	0 16 3 24	..	..
13	..	..	..	0 11 3 22	..	..	..	1 0 2 14
14	..	..	..	0 12 0 26	..	..	..	1 1 1 7
15	..	..	..	0 12 2 20	..	..	..	0 13 2 0
16	..	..	..	0 11 1 27	..	..	..	0 15 3 26
17	..	..	..	1 5 2 0	..	..	1 12 0 15	..
19	..	..	..	0 14 1 19	..	..	0 14 2 6	..
20	..	..	..	0 12 2 16	..	..	..	0 15 3 0
21	..	..	..	0 13 1 6	..	..	0 5 3 12	0 3 1 2
22	..	..	0 11 1 18	..	..	..	0 15 3 7	[8 14 0 21]
23	..	..	1 19 1 6	..	..	..	..	Total
24	..	..	2 8 0 18	..	..	..	..	1st Crop.
26	..	..	1 14 2 6	..	..	..	..	
27	..	0 17 3 12	0 11 1 9	..	..	..	..	..
28	..	..	0 10 2 0	..	..	0 17 0 9	..	..
29	..	0 1 2 7	0 9 3 18	..	0 4 3 6	..	0 17 2 21	..
30	..	..	0 10 1 25	..	..	..	1 2 2 10	..
31	..	..	1 0 0 21	..	0 12 2 10	..	1 15 3 16	..
Monthly Total	..	0 19 1 19	9 15 3 9	8 7 3 6	0 17 1 16	1 14 0 5	11 13 2 7	8 14 0 21
	1st Crop.	1st Crop. (*cont.*)	1st Crop. (*cont.*)	1st Crop. (*cont.*)	1st Crop. (*cont.*)	1st Crop. (*cont.*)	1st Crop. (*cont.*)	2d Crop.
June 2	..	..	0 10 3 9	..	0 6 3 23	..	0 14 1 4	..
3	..	..	0 9 0 23	..	0 6 1 16	..	0 14 2 1	..
4	..	..	0 10 1 4	..	0 4 2 26	..	0 7 3 3	..
5	..	..	0 9 0 25	..	..	..	0 11 0 12	..
6	..	..	..	0 9 3 22	0 4 2 26	0 9 1 1	[14 1 0 27]	..
7	..	..	..	0 15 3 13	0 10 1 23	1 10 3 4	Total	..
9	..	..	..	0 8 1 2	0 6 1 23	0 14 0 21	1st Crop.	..
10	..	..	..	0 11 0 6	0 6 0 3	0 19 2 17	..	..
11	..	..	..	0 8 2 27	0 7 0 12	1 2 1 16	..	..
12	..	..	..	0 10 0 8	0 6 1 19	0 12 1 7	..	..
13	..	..	..	0 10 0 17	0 5 1 4	0 14 0 27	..	..
14	..	..	..	0 14 2 6	0 10 3 18	0 16 2 23	..	..
16	..	..	..	0 9 0 13	0 7 0 12	0 13 2 5	..	..
17	..	..	..	0 8 3 6	0 5 1 25	0 13 0 4	..	..
18	..	..	..	0 8 3 7	0 5 0 14	0 14 1 6	..	..
19	..	..	2 0 0 14	[14 3 0 21]	0 4 2 26	0 15 1 21	..	..
20	..	..	0 9 3 4	Total	0 5 0 12	0 13 2 14	..	..
21	..	1 5 3 18	0 19 2 11	1st Crop.	0 12 0 9	1 5 0 7	..	..
23	..	0 12 3 9	0 7 0 20		0 5 2 3	0 13 0 4	..	..
24	..	1 0 2 22	[15 12 0 7]	..	0 4 1 3	0 13 0 2	..	..
25	..	0 8 2 24	Total	..	0 4 2 21	0 12 1 22	..	..
26	..	0 19 1 15	1st Crop.	..	0 5 0 26	0 14 0 25	..	..
27	..	..		..	0 4 2 27	0 12 3 1	..	..
28	0 5 2 13	0 14 0 23	..	..	0 11 0 4	[16 14 0 8]	..	0 18 0 7
30	0 2 3 13	0 8 1 11	..	..	..	Total 1st Crop.	..	0 17 1 0
Monthly Total	0 8 1 26	5 10 0 10	5 16 0 26	5 15 1 15	7 10 2 11	15 0 0 3	2 7 2 20	1 15 1 7

* Area of Plot 1, five-acre field = 0·80756 acre, and of Plot 1, ten-acre field = 0·79275 acre; for the areas of the sewaged plots, see preceding Tables I. and II. of sewage applied.

Table III.—*continued.*

Detailed Record of the Amounts of Green Produce obtained in the Experiments on Permanent Grass Land.

Second Season 1862.

Dates of Cuttings.	Green Grass obtained (calculated per acre).							
	Five-acre Field.				Ten-acre Field.			
	Without Sewage.	With Sewage.			Without Sewage.	With Sewage.		
	Plot 1.	Plot 2.	Plot 3.	Plot 4.	Plot 1.	Plot 2.	Plot 3.	Plot 4.
	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.
	1st Crop. (*cont.*)	1st Crop. (*cont.*)		2d Crop.	1st Crop. (*cont.*)	2d Crop.	2d Crop.	2d Crop. (*cont.*)
July 1	0 2 1 10	0 9 0 22	..	..	0 5 3 6	..	..	0 12 3 3
2	0 2 2 9	0 8 0 3	..	..	..	..	..	0 18 0 0
3	0 2 0 26	0 8 1 19	..	..	0 3 0 17	..	..	0 15 2 0
4	..	0 3 2 8	..	..	0 3 1 24	..	..	0 7 1 20
5	0 5 1 16	0 15 2 8	..	..	0 8 3 11	..	..	1 10 3 25
7	0 2 2 17	0 9 0 5	..	..	0 4 0 25	..	..	0 16 2 11
8	0 2 2 9	0 4 2 7	..	0 0 3 8	0 6 1 16	..	..	0 16 3 22
9	0 2 3 11	0 7 1 12	..	..	0 5 2 6	..	..	0 18 2 10
10	0 2 1 0	0 7 2 11	..	..	..	..	..	0 16 0 0
11	0 2 2 19	0 7 1 11	..	..	0 3 2 17	..	..	0 16 1 12
12	0 5 3 18	0 17 2 23	..	..	0 6 3 27	..	1 7 1 19	0 7 0 11
14	0 2 3 5	0 8 1 18	..	..	0 3 1 19	..	0 12 2 11	[10 11 2 9]
15	0 2 1 12	0 8 1 14	..	..	[10 19 1 27]	..	0 14 2 26	Total 2d Crop.
16	0 2 1 10	0 7 1 25	..	..	Total 1st Crop.	..	0 18 3 1	
17	0 2 1 8	0 7 0 12	..	..		..	0 14 1 26	
18	0 2 2 8	0 8 3 0	..	..		..	0 16 2 7	..
19	0 4 2 15	0 12 0 23	..	..	..	0 3 3 21	1 5 1 0	..
21	0 2 1 6	0 6 0 12	..	..	..	..	[6 9 3 6]	..
22	0 2 1 13	0 5 3 22	..	..	..	..	Total 2d Crop.	..
23	0 2 0 26	[14 12 1 4]	..	0 8 1 5	..	..		..
24	0 2 2 12	Total 1st Crop.	..	0 8 2 4	..	0 4 3 3	..	..
25	0 2 1 3		..	0 10 0 6	..	..	..	..
26	0 4 2 16	..	..	0 15 1 14	..	..	..	..
28	0 2 1 17	..	..	0 9 0 17	..	..	..	..
29	0 1 3 22	..	..	0 8 2 24	..	..	..	..
30	0 1 3 17	..	..	1 1 0 17	..	..	..	..
31	0 5 0 6	..	..	0 17 1 8	..	..	..	..
Monthly Total	3 16 0 23	8 2 3 3	..	4 19 1 19	2 11 2 0	0 8 2 24	6 9 3 6	8 16 1 2
	1st Crop. (*cont.*)	2d Crop.	2d Crop.	2d Crop. (*cont.*)	2d Crop.	2d Crop. (*cont.*)		3d Crop.
Aug. 1	0 4 3 20	..	..	0 18 2 1	..	..	..	..
2	0 10 0 12	..	0 9 3 0	1 2 0 23	..	..	..	..
4	0 1 2 20	.	0 9 0 5	[7 0 0 15]	..	..	..	..
5	0 1 3 19	..	0 9 1 8	Total 2d Crop.	..	..	..	..
6	0 2 1 0	..	0 11 0 14		..	..	..	..
7	0 2 0 1	..	0 12 3 8	..	..	..	..	..
8	0 2 0 21	..	0 9 3 20	..	..	..	..	..
9	0 4 1 13	..	0 19 3 9	..	..	..	..	..
11	0 1 3 27	..	0 9 2 9	..	..	..	..	..
12	0 1 2 9	..	0 9 3 3	..	..	..	..	..
13	0 1 2 20	..	0 9 2 15	..	..	..	..	..
14	0 2 3 11	..	0 12 1 24	..	..	..	..	..
15	0 1 3 16	..	0 9 1 1	..	..	..	..	..
16	0 2 3 26	..	0 18 1 4	..	..	..	..	..
18	0 2 1 12	..	0 12 1 11	..	..	..	..	..
19	0 1 3 16	..	0 10 1 1	..	..	0 16 0 22	..	..
20	0 1 3 19	..	0 10 0 19	..	..	0 10 1 0	..	..
21	[6 13 1 3]	..	0 8 2 14	..	..	0 15 3 1	..	..
22	Total 1st Crop.	0 10 1 4	[9 12 0 25]	..	..	0 18 1 11	..	..
23		0 19 0 27	Total 2d Crop.	..	..	1 17 2 24	..	..
25	..	0 8 1 25		..	..	0 13 1 5	..	..
26	..	0 9 2 20		..	..	0 17 2 10	..	..
27	..	0 10 1 9	..	..	..	0 3 0 14	..	0 10 3 13
28	..	0 9 2 14	..	..	0 3 1 19	[7 0 3 27]	..	0 18 1 21
29	..	0 9 0 13	..	..	0 3 1 24	Total 2d Crop.	..	0 15 0 7
30	..	0 19 3 16	..	..	0 4 3 13		..	0 11 1 23
Monthly Total	2 8 2 10	4 16 2 16	9 12 0 25	2 0 2 24	0 11 3 0	6 12 1 3	..	2 15 3 8

Table III.—*continued.*

Detailed Record of the Amounts of Green Produce obtained in the Experiments on Permanent Grass Land.

Second Season 1862.

Dates of Cuttings.	Green Grass obtained (calculated per acre). Five-acre Field. Without Sewage. Plot 1.	Five-acre Field. With Sewage. Plot 2.	Five-acre Field. With Sewage. Plot 3.	Five-acre Field. With Sewage. Plot 4.	Ten-acre Field. Without Sewage. Plot 1.	Ten-acre Field. With Sewage. Plot 2.	Ten-acre Field. With Sewage. Plot 3.	Ten-acre Field. With Sewage. Plot 4.
	tons. cwts. qrs. lbs.	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*
		2d Crop. (*cont.*)	3d Crop.	3d Crop.	2d Crop. (*cont.*)	3d Crop.	3d Crop.	3d Crop. (*cont.*)
Sept. 1	..	0 10 2 25	..	..	0 3 2 16	..	..	0 14 1 13
2	..	0 11 0 9	..	..	0 5 0 5	..	..	0 16 0 0
3	..	0 10 3 13	..	..	0 5 0 7	..	..	0 14 0 0
4	..	0 10 1 10	..	..	0 4 3 27	..	..	0 19 0 2
5	..	0 10 0 10	..	..	0 4 3 17	..	..	1 9 2 12
6	..	0 19 2 22	..	..	0 10 2 25	..	0 3 1 1	1 9 2 13
8	..	0 7 2 5	..	..	0 5 0 23	..	0 6 0 24	[8 18 1 20]
9	..	[8 16 3 26]	..	..	0 4 1 26	..	0 17 1 1	Total 3d Crop.
10	..	Total 2d Crop.	..	..	0 5 0 8	..	0 17 2 22	
11	..		..	0 1 3 15	0 5 3 10	..	0 16 0 14	
12	..		..	0 10 0 14	0 4 1 12	..	0 16 0 7	..
13	..	..	..	0 18 0 6	0 8 3 9	..	1 13 3 1	..
15	..	..	..	0 11 0 27	[3 19 3 17]	..	1 1 2 24	..
16	..	..	..	0 10 2 14	Total 2d Crop.	..	0 17 3 22	..
17	..	..	..	0 11 2 6		..	1 1 1 3	..
18	..	..	..	0 11 3 23		..	0 16 0 7	..
19	..	..	..	0 11 1 3	..	..	0 9 0 8	..
20	..	..	..	0 18 0 22	..	..	[9 16 1 22]	..
22	..	..	0 17 0 21	0 10 0 22	..	..	Total 3d Crop.	..
23	..	..	0 19 0 0	0 9 0 26	..	..		..
24	..	..	0 18 1 1	0 10 0 0	..	..		..
25	..	..	1 2 2 6	0 11 2 9	..	..	..	..
26	..	..	0 18 2 3	0 10 0 16	..	..	..	..
27	..	..	1 17 0 7	0 18 0 12	..	..	..	..
29	..	..	..	0 10 2 18	..	..	..	..
30	..	..	..	0 10 0 19	..	0 16 0 8	..	..
				[9 15 0 0]				
				Total 3d Crop.				
Monthly Total	..	4 0 1 10	6 12 2 10	9 15 0 0	3 8 0 17	0 16 0 8	9 16 1 22	6 2 2 12
	2d Crop.	3d Crop.	3d Crop. (*cont.*)	4th Crop.		3d Crop. (*cont.*)	4th Crop.	4th Crop.
Oct. 1	..	..	0 14 0 19	..	..	0 12 3 3	..	..
2	..	..	0 10 2 25	..	..	0 14 3 3	..	..
3	..	0 8 3 14	0 3 2 7	..	..	0 14 0 20	..	..
4	0 4 3 2	0 17 3 6	[8 1 0 5]	..	..	0 9 3 24	..	0 18 2 0
6	0 2 1 8	0 6 3 10	Total 3d Crop.	..	..	[3 7 3 2]	..	..
7	0 2 1 3	0 11 0 24		..	..	Total 3d Crop.	..	..
8	0 2 1 6	0 9 1 5		..	..		..	..
9	0 2 1 4	0 9 1 9	..	..	..	..	..	1 5 2 4
10	0 2 1 24	0 9 1 17	..	..	..	..	..	..
11	0 4 2 1	0 5 2 8	..	..	..	..	..	0 17 0 15
13	0 2 1 3	[3 18 1 9]	..	..	..	..	0 12 1 6	..
14	0 2 1 8	Total 3d Crop.	..	0 9 2 1	..	..	0 19 1 8	..
15	0 2 1 0		..	0 8 1 25	..	..	0 3 1 1	0 0 3 14
16	0 2 1 4		..	0 8 3 18	..	..	[1 14 3 15]	[3 2 0 5]
17	[1 10 0 7]	..	4th Crop.	0 4 1 26	..	..	Total 4th Crop.	Total 4th Crop.
18	Total 2d Crop.	..	0 14 1 13	[1 11 1 14]	..	..		
28		4th Crop.	0 10 1 25	Total 4th Crop.	..	4th Crop.	..	..
29	..	0 10 2 7	[1 4 3 10]		..	0 8 1 11	..	5th Crop.
30	..	Total 4th Crop.	Total 4th Crop.	..	..	Total 4th Crop.	..	0 6 0 21
31	..			..				Total 5th Crop.
Monthly Total	1 10 0 7	4 8 3 16	2 13 1 5	1 11 1 14	..	3 0 0 5	1 14 3 15	3 8 0 26
					3d Crop.			
Nov. 7	..	..	..	..	1 10 3 9	..	..	.
					Total 3d Crop.			
Monthly Total	..	..	..	..	1 10 3 9	..	..	..

Table IV.

Detailed Record of the Amounts of Green Produce obtained in the Experiments on Permanent Grass Land.

Third Season 1863.

Dates of Cuttings.	Green Grass obtained (calculated per acre). Five-acre Field. Without Sewage. Plot 1.	Five-acre Field. With Sewage. Plot 2.	Five-acre Field. With Sewage. Plot 3.	Five-acre Field. With Sewage. Plot 4.	Ten-acre Field. Without Sewage. Plot 1.	Ten-acre Field. With Sewage. Plot 2.	Ten-acre Field. With Sewage. Plot 3.	Ten-acre Field. With Sewage. Plot 4.
	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.
				1st Crop.				1st Crop.
April 20	..	..	..	..	..	..	..	0 10 1 0
21	..	..	..	..	..	..	..	0 14 3 0
22	..	..	..	..	..	..	..	0 15 1 0
23	..	..	..	0 14 2 20	..	..	..	..
25	..	..	..	..	..	..	..	0 16 1 0
27	..	..	..	0 17 1 18	..	..	..	..
28	..	..	..	0 18 3 17	..	..	..	..
29	..	..	..	1 5 3 13	..	..	..	..
30	..	..	..	..	..	..	..	0 18 1 0
Monthly Total	..	..	..	3 16 3 12	..	..	..	3 14 3 0
		1st Crop.	1st Crop.	1st Crop.			1st Crop.	1st Crop.
May 1	..	..	..	0 12 1 21	..	..	..	..
2	..	..	..	2 1 0 5	..	..	..	..
4	..	..	..	0 15 2 19	..	..	..	..
5	..	..	..	0 12 2 20	..	..	..	..
6	..	..	..	0 14 2 20	..	..	..	..
7	..	..	..	..	..	..	..	0 15 3 0
8	..	..	..	..	..	..	..	2 0 3 27
9	..	..	0 16 0 13	1 3 2 14	..	..	..	..
11	..	..	2 9 0 16	[9 16 3 27]	..	..	..	..
12	..	..	1 10 3 15	Total	..	..	..	..
13	..	..	1 15 3 26	1st Crop.	..	..	..	..
14	..	..	..	..	..	..	0 19 1 9	0 16 2 0
15	..	..	..	..	..	..	1 4 3 11	0 14 2 0
16	..	..	..	..	..	..	1 12 2 14	[8 2 1 27]
18	..	..	1 15 2 24	..	..	..	..	Total
19	..	..	1 13 0 4	..	..	..	..	1st Crop.
20	..	..	1 11 1 19	..	..	..	..	..
21	..	..	..	..	..	..	1 13 0 15	..
22	..	..	..	..	..	..	1 14 3 15	..
23	..	..	..	..	..	..	1 15 1 16	..
25	..	0 11 3 8	0 12 2 13	..	..	..	..	..
26	..	0 16 2 11	[12 4 3 18]	..	..	..	..	..
27	.	0 12 1 14	Total	..	..	..	..	..
28	..	0 11 1 1	1st Crop.	..	..	..	..	..
29	..	0 11 2 1	..	..	..	..	..	..
30	..	1 5 3 18	..	..	..	..	..	..
Monthly Total	..	4 9 1 25	12 4 3 18	6 0 0 15	..	..	9 0 0 24	4 7 2 27

Table IV.—*continued.*

Detailed Record of the Amounts of Green Produce obtained in the Experiments on Permanent Grass Land.

Third Season 1863.

Dates of Cuttings.	Green Grass obtained (calculated per acre).							
	Five-acre Field.				Ten-acre Field.			
	Without Sewage.	With Sewage.			Without Sewage.	With Sewage.		
	Plot 1.	Plot 2.	Plot 3.	Plot 4.	Plot 1.	Plot 2.	Plot 3.	Plot 4.
	tons. cwts. qrs. lbs.	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*
		1st Crop. (*cont.*)	2d Crop.	2d Crop.	1st Crop.	1st Crop.	1st Crop. (*cont.*)	2d Crop.
June 1	..	0 11 3 22	..	..	..	..	..	..
2	..	0 10 0 14	..	..	..	..	..	..
3	..	1 10 1 21	..	..	..	..	..	..
4	..	..	..	..	..	..	1 13 0 8	..
5	..	..	..	..	..	..	0 18 0 23	..
6	..	..	..	..	..	1 10 3 14	0 17 2 8	..
8	..	..	..	..	..	1 11 2 3	[12 9 0 7]	..
9	..	..	..	..	..	1 10 3 1		..
10	..	..	..	..	..	1 13 1 24	Total	..
11	..	..	..	..	..	1 12 2 5	1st Crop.	..
12	..	..	..	..	..	1 12 2 17	..	..
13	..	..	..	..	..	1 19 2 13	..	..
15	..	0 13 2 18	..	..	..	..	..	..
16	..	1 8 3 5	..	..	..	..	..	..
17	..	1 9 3 7	..	..	..	..	..	..
18	..	[10 14 1 0]	..	..	..	1 10 2 1	..	..
19	..	Total	..	..	..	[13 1 3 22]	..	1 15 0 0
20	..	1st Crop.	..	2 5 3 18	..		..	..
22	..	..	..	1 11 1 11	..	Total	..	..
23	..	..	0 16 2 7	..	..	1st Crop.	..	..
24	..	..	0 14 3 10	..	0 4 0 11	..	2d Crop.	7 6 0 23
25	..	..	..	4 6 3 0	0 5 2 3	..	0 12 1 19	2 12 1 26
26	..	..	..	2 9 1 27	0 5 3 25	..	0 9 1 6	[11 13 2 21]
27	..	..	..	[10 13 2 0]	0 6 3 1	..	1 5 2 14	Total
29	..	..	0 18 3 6		1 5 3 0	..	..	2d Crop.
30	..	..	0 19 1 25	Total 2d Crop.	0 19 3 13	..	..	..
Monthly Total	..	6 4 3 3	3 9 2 20	10 13 2 0	3 7 3 25	13 1 3 22	5 16 0 22	11 13 2 21
	1st Crop.	2d Crop.	2d Crop. (*cont.*)		1st Crop. (*cont.*)	2d Crop.	2d Crop. (*cont.*)	3d Crop.
July 1	..	..	1 0 3 0	..	0 14 0 22	..	..	..
2	..	..	..	..	0 7 3 15	..	0 12 0 20	..
3	..	..	..	..	0 8 0 7	..	0 15 3 19	..
4	..	..	..	..	0 12 0 11	..	1 6 0 3	..
6	..	..	0 16 1 0	..	..	..	..	..
7	..	..	0 17 3 20	..	..	..	..	..
8	..	..	1 0 0 9	..	0 6 1 24	..	..	..
9	2 6 0 6	..	..	..	0 4 1 26	..	1 0 0 17	..
10	..	..	..	..	0 6 3 6	..	1 0 3 10	..
11	0 4 0 23	..	1 7 1 12	..	[6 7 3 24]	..	[7 2 1 24]	..
13	0 3 0 23	..	0 15 0 17	..	Total	..	Total	..
14	0 4 0 13	0 10 0 19	[9 7 0 22]	..	1st Crop.	..	2d Crop.	..
15	0 3 0 1	0 13 1 11		..	..	..	..	..
16	..	0 16 1 11	Total	..	..	..	..	..
17	..	1 0 0 0	2d Crop.	..	..	..	..	..
18	0 9 1 4	1 8 0 27	..	..	..	..	..	..
20	0 3 2 17	1 4 2 23	..	..	..	..	..	..
22	..	..	..	..	..	0 6 3 10	..	..
23	..	..	..	..	..	0 15 0 3	..	..
24	..	..	..	..	..	0 13 3 20	..	..
25	..	..	..	..	..	1 9 2 13	..	..
27	0 5 1 11	0 15 0 2	..	..	..	..	..	..
28	[3 18 3 14]	[6 7 3 9]	..	..	..	0 18 2 26	..	..
29			..	..	..	1 1 2 2	..	..
30	Total 1st Crop.	Total 2d Crop.	..	..	..	0 7 1 16	..	..
31	..	..	..	..	..	[5 13 0 6] Total 2d Crop.	..	0 9 3 12
Monthly Total	3 18 3 14	6 7 3 9	5 17 2 2	..	2 19 3 27	5 13 0 6	4 15 0 13	0 9 3 12

Table IV.—*continued.*

Detailed Record of the Amounts of Green Produce obtained in the Experiments on Permanent Grass Land.

Third Season 1863.

Dates of Cuttings.	Green Grass obtained (calculated per acre). Five-acre Field. Without Sewage. Plot 1.	Five-acre Field. With Sewage. Plot 2.	Five-acre Field. With Sewage. Plot 3.	Five-acre Field. With Sewage. Plot 4.	Ten-acre Field. Without Sewage. Plot 1.	Ten-acre Field. With Sewage. Plot 2.	Ten-acre Field. With Sewage. Plot 3.	Ten-acre Field. With Sewage. Plot 4.
	tons. cwts. qrs. lbs.	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*
			3d Crop.	3d Crop.			3d Crop.	3d Crop. (*cont.*)
Aug. 1	..	..	..	1 11 1 3	..	..	..	..
3	..	..	..	0 18 0 18	..	..	..	..
4	..	..	..	0 14 3 26	..	..	..	..
5	..	..	..	0 19 2 3	..	..	..	..
6	..	..	..	0 19 0 3	..	..	..	..
7	..	..	..	..	..	..	..	0 15 2 0
8	..	..	1 12 3 10	..	..	..	..	..
10	..	..	1 3 2 15	..	..	..	..	..
11	..	..	..	..	..	..	..	0 15 0 0
12	..	..	..	..	..	..	..	0 14 0 0
13	..	..	..	0 16 2 5	..	..	..	..
14	..	..	..	0 19 0 3	..	..	..	..
15	..	..	1 6 1 8	[6 18 2 5]	..	..	..	..
17	..	..	..		..	..	..	0 15 1 0
18	..	..	..	Total	..	..	..	0 15 2 0
19	..	..	..	3d Crop.	..	..	..	0 16 1 0
20	..	..	..	..	..	..	..	0 16 1 14
21	..	..	..	..	..	..	..	0 16 3 0
22	..	..	..	..	..	..	..	1 12 0 0
24	..	..	..	..	..	..	0 14 3 7	[8 6 1 26]
25	..	..	..	..	..	..	0 12 3 6	
26	..	..	..	..	..	..	0 15 3 7	Total
27	..	..	..	..	..	..	1 0 1 9	3d Crop.
28	..	..	..	..	..	..	0 15 3 7	..
29	..	..	..	4th Crop.	..	..	1 15 0 20	..
31	..	..	..	0 17 1 11	..	..	..	..
Monthly Total	..	..	4 2 3 5	7 15 3 16	..	..	5 14 3 0	7 16 2 14
	2d Crop.	3d Crop.	3d Crop. (*cont.*)	4th Crop. (*cont.*)	2d Crop.	3d Crop.	3d Crop. (*cont.*)	4th Crop.
Sept. 1	..	..	..	0 18 2 3	..	..	..	..
2	..	..	..	..	..	..	..	0 12 3 0
3	..	..	0 15 1 7	..	..	..	..	..
4	..	..	1 8 1 17	..	..	..	..	..
5	..	..	..	..	..	..	1 5 1 12	..
7	..	..	0 16 1 0	..	..	..	[7 0 0 12]	..
8	..	..	[7 2 3 1]	1 8 0 11	..	..	Total	..
9	..	..		1 1 3 8	..	..	3d Crop.	..
10	..	..	Total	..	..	0 18 0 11	..	..
11	..	..	3d Crop.	..	..	1 1 0 1	..	..
12	..	1 0 3 15	..	..	..	..	..	..
14	..	0 14 0 10	..	..	..	..	..	..
15	..	..	..	0 14 1 27	..	..	..	..
16	..	0 12 2 2	..	..	..	..	..	..
18	..	..	..	..	..	0 17 3 11	..	..
19	..	..	..	..	0 11 3 9	1 4 2 6	..	..
21	..	..	..	0 14 2 13	..	..	..	..
22	0 5 2 8	..	..	0 17 0 11	..	..	..	..
23	0 3 2 24	..	..	1 1 1 23	..	..	..	..
24	0 10 2 23	..	..	0 17 3 18	..	..	..	..
25	[0 19 3 27]	..	..	[8 11 1 13]	..	0 17 3 13	..	..
26		..	4th Crop.		1 1 0 14	1 1 2 16	..	..
28	Total		1 2 0 25	Total	[1 12 3 23]	[6 1 0 2]	..	..
29	2d Crop.	..	1 11 0 17	4th Crop.	Total	Total	..	..
30	..	..	0 18 3 13	..	2d Crop.	3d Crop.	..	..
Monthly Total	0 19 3 27	2 7 1 27	6 12 0 23	7 14 0 2	1 12 3 23	6 1 0 2	1 5 1 12	0 12 3 0

Table IV.—*continued.*

Detailed Record of the Amounts of Green Produce obtained in the Experiments on Permanent Grass Land.

Third Season 1863.

Dates of Cuttings.	Green Grass obtained (calculated per acre).							
	Five-acre Field.				Ten-acre Field.			
	Without Sewage.	With Sewage.			Without Sewage.	With Sewage.		
	Plot 1.	Plot 2.	Plot 3.	Plot 4.	Plot 1.	Plot 2.	Plot 3.	Plot 4.
	tons. cwts. qrs. lbs.	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*
		3d Crop. (*cont.*)	4th Crop. (*cont.*)	5th Crop.			4th Crop.	4th Crop. (*cont.*)
Oct. 1	..	..	..	..	..	..	..	1 10 0 0
2	..	..	..	..	..	..	..	0 19 3 21
3	..	..	..	..	..	..	..	1 10 3 10
5	..	..	1 12 1 5	..	..	..	..	..
6	..	..	..	..	..	..	..	0 17 0 14
7	..	..	..	..	..	..	0 9 0 20	0 14 2 14
8	..	..	..	..	..	..	1 4 0 25	[6 5 1 3] Total 4th Crop.
9	..	..	..	..	..	..	1 16 2 3	
10	..	0 15 3 11	..	..	..	..	[3 9 3 20] Total 4th Crop.	..
13	..	0 19 2 14	..	..	..	..		..
14	..	[4 2 3 24] Total 3d Crop.	0 13 2 0	..	..	..	..	..
19	..		[5 18 0 4] Total 4th Crop.	0 14 1 20 Total 5th Crop.	..	..	..	..
		4th Crop.						
20	..	0 9 0 13	..	..	..	..	..	..
21	..	0 7 3 5	..	..	..	..	..	..
		[0 16 3 18] Total 4th Crop.						
Monthly Total	..	2 12 1 15	2 5 3 5	0 14 1 20	..	..	3 9 3 20	5 12 2 3
		5th Crop.	5th Crop.	6th Crop.		4th Crop.	5th Crop.	5th Crop.
Nov. 27	..	0 3 0 16 Total 5th Crop.	0 5 2 10 Total 5th Crop.	0 5 2 24 Total 6th Crop.	..	..	..	..
28	..				..	0 9 1 6 Total 4th Crop.	0 10 0 5 Total 5th Crop.	0 11 2 0 Total 5th Crop.
Monthly Total	..	0 3 0 16	0 5 2 10	0 5 2 24	..	0 9 1 6	0 10 0 5	0 11 2 0

Table V.

Detailed Record of the Sewage applied, and of the Amounts of Green Produce obtained in Experiments on Italian Rye-grass. Season 1863.

Dates.	Average time* taken to fill Gauge-tank (3·308 tons).	Time of application.	Sewage applied (calculated per acre). Plot 2. (Area 0·999 acre.)	Sewage applied (calculated per acre). Plot 3. (Area 0·99831 acre.)	Green Grass obtained (calculated per acre). Without Sewage. Plot 1. (Area 1·00184 acre.)	Green Grass obtained (calculated per acre). With Sewage. Plot 2. (Area 0·999 acre.)	Green Grass obtained (calculated per acre). With Sewage. Plot 3. (Area 0·99831 acre.)
	Mins.	H. M.	Tons.	Tons.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.
					1st Crop.	1st Crop.	1st Crop.
April 24	..	..	..	..	..	0 17 0 2	1 10 2 6
25	..	..	..	..	..	1 12 0 17	0 16 0 3
27	..	..	..	..	..	0 14 1 1	1 9 1 6
28	..	..	..	..	1 3 2 16	1 0 0 2	[3 15 3 15] Total 1st Crop.
29	91·67	12 0	..	26·03	1 5 2 21	[4 3 1 22]	
30	101·67	11 15	..	22·00	0 15 0 12	Total 1st Crop.	
Monthly Total	(96·24)	23 15	..	48·03	3 4 1 21	4 3 1 22	3 15 3 15
May 1	120·00	12 0	19·87	..	0 11 0 22	..	..
2	107·50	11 30	..	21·27	0 12 0 21	..	..
4	137·50	5 0	..	7·23	0 14 1 8	..	..
5	133·33	12 0	..	17·89	[5 2 0 16]	..	..
6	120·00	11 30	19·04	..	Total 1st Crop.	..	..
7	117·50	11 30	..	19·46		..	..
8	122·50	11 15	..	18·26		..	..
9	120 00	11 0	18·21	..	..	..	..
11	123·33	12 0	..	19·35	..	..	..
12	137·50	10 0	..	14·46	..	..	..
13	88·75	11 30	25·75	..	..	..	..
14	112·50	12 0	..	21·21	..	..	..
18	75·00	4 30	..	11·93	..	..	..
19	72·50	12 0	32·89	..	..	..	..
20	69·00	12 0	..	34·58	..	..	2d Crop.
27	67·50	4 30	..	13·25	..	..	0 7 1 21
28	65·60	12 0	36·34	..	..	..	0 2 3 22
29	71·25	10 45	..	30·00	..	..	0 7 3 18
30	72·60	10 30	..	28·76	..	..	0 13 0 2
Monthly Total	(95·80)	197 30	152·10	257·65	1 17 2 23	..	1 11 1 7
June 1	88·75	10 15	22·95	..	..	..	0 7 2 1
2	78·75	12 0	..	30·30	..	..	0 7 1 15
3	101·67	8 45	..	17·11	..	..	0 7 2 13
4	95·00	10 30	21·96	..	..	..	0 11 1 2
5	90·00	12 0	..	26·51	..	..	0 5 0 3
6	90·00	11 0	..	24·30	..	..	0 14 0 3
8	97·50	9 15	..	18·86	..	..	0 10 0 2
9	130·00	11 0	..	16·83	..	..	0 6 0 21
10	85·00	10 15	..	23·97	..	2d Crop.	0 6 3 9
11	76·00	12 0	..	31·39	..	0 5 1 0	0 6 3 11
12	87·50	12 0	..	27·27	..	0 7 2 25	[5 14 0 3]
13	73·75	11 0	..	29·65	..	0 17 0 2	Total 2d Crop.
15	116·67	8 30	14·48	..	..	1 4 2 6	
16	102·50	11 15	..	21·82	..	0 12 0 25	..
17	96·25	8 45	..	18·07	..	0 6 1 1	..
18	93·75	12 0	25·43	..	..	0 8 1 21	..
19	86·25	12 0	..	27·66	..	0 10 1 21	..
20	85·00	9 0	..	21·05	..	0 14 3 2	..
22	86·25	8 45	20·16	..	.. 2d Crop.	1 2 3 3	..
23	83·33	7 0	16·69	..	0 17 3 18	0 8 2 8	3d Crop.
24	(6·00 tanks)	12 0	..	19·88	0 15 0 20	0 3 1 25	0 3 1 1
25	(6·00 ,,)	..	19·87	..	1 1 3 16	[7 1 1 27]	0 5 0 16
26	(5·75 ,,)	..	19·04	..	1 0 3 17	Total 2d Crop.	0 9 1 2
27	(5·25 ,,)	..	17·38	..	1 11 3 11		0 11 2 16
29	..	..	..	..	2 6 2 3		0 10 1 13
30	..	..	..	..	1 3 3 1	..	0 7 1 25
					[8 18 0 2] Total 2d Crop.		
Monthly Total	..	..	177·96	354·66	8 18 0 2	7 1 1 27	6 9 3 13

* When the *number of tanks* is given, the flow was too slow and irregular to estimate it by the average time taken to fill the gauge-tank, and therefore the actual number of tankfuls was counted.

TABLE V.—*continued.*

Detailed Record of the Sewage applied, and of the Amounts of Green Produce obtained in Experiments on Italian Rye-grass.

Season 1863.

DATES.	Average Time * taken to fill Gauge-tank (3·308 tons).	Time of application.	Sewage applied (calculated per acre). Plot 2. (Area 0·999 acre.)	Sewage applied (calculated per acre). Plot 3. (Area 0·99831 acre.)	Green Grass obtained (calculated per acre). Without Sewage. Plot 1. (Area 1·00484 acre.)	Green Grass obtained (calculated per acre). With Sewage. Plot 2. (Area 0·999 acre.)	Green Grass obtained (calculated per acre). With Sewage. Plot 3. (Area 0·99831 acre.)
	Mins.	H. M.	Tons.	Tons.	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*
							3d Crop.
July 1	(3·25 tanks)	..	10·76	..	..	..	0 6 1 1
2	(5·75 ,,)	..	19·04	..	..	..	0 11 0 18
3	(5·00 ,,)	..	..	16·57	..	..	0 7 0 1
4	(3·00 ,,)	..	9·93	..	..	..	0 14 0 3
6	(1·50 ,,)	..	..	4·97	..	..	0 9 1 2
,,	30·50	2 0	..	13·04			
7	(4·75 tanks)	..	15·73	..	..	..	0 14 1 3
,,	31·50	2 0	12·62	..			
8	(2·75 tanks)	..	..	9·11	..	..	0 5 3 1
,,	26·50	2 0	..	15·01			
9	(6·00 tanks)	..	19·87	..	..	..	0 7 3 1
10	(4·73 ,,)	..	..	15·67	..	..	0 9 0 12
11	(6·30 ,,)	..	..	20·88	..	..	0 15 2 10
						3d Crop.	[7 7 1 13] Total 3d Crop.
13	(2·52 ,,)	..	..	8·35	..	0 10 0 11	
,,	24·50	2 0	..	16·23			
14	(3·00 tanks)	..	..	9·94	..	0 8 2 1	
,,	23·50	2 0	..	16·92			
15	(5·18 tanks)	..	..	17·16	..	0 7 0 13	..
,,	24·50	2 0	..	16·23			
16	(6·75 tanks)	..	..	22·37	..	0 7 0 6	..
,,	24·00	2 0	..	16·57			
17	(4·93 tanks)	..	..	16·34	..	0 10 0 27	..
,,	24·50	2 0	..	16·23			
18	(6·00 tanks)	..	..	19·88	..	0 13 0 1	..
20	(3·00 ,,)	..	..	9·94	..	0 6 3 9	..
,,	23·50	2 0	..	16·92			
21	(4·00 tanks)	..	13·25	..	..	0 7 0 15	..
,,	25·50	2 0	15·58	..			
22	(3·75 tanks)	..	12·42	..	..	0 10 2 1	..
,,	25·50	2 0	15·58	..			
23	(7·00 tanks)	..	..	23·20	..	0 5 2 25	..
,,	29·50	2 0	..	13·48			
24	(6·83 tanks)	..	22·62	..	..	0 7 0 17	..
,,	32·50	2 0	12·23	..			
25	(2·30 tanks)	..	..	7·62	..	0 13 2 22	..
,,	28·00	2 0	..	14·20			
27	(3·55 tanks)	..	..	11·76	..	0 7 0 7	..
,,	29·50	2 0	..	13·48			4th Crop.
28	(1·00 tank)	..	3·31	..	..	0 2 3 6	0 6 0 15
,,	32·50	2 0	12·23	..		[5 16 3 21]	0 7 2 1
29	(0·93 tanks)	..	..	3·08	..	Total 3d Crop.	0 9 1 8
30	(6·93 ,,)	..	22·95	..	..		0 7 2 1
31	(5·43 ,,)	..	..	17·99	..		
Monthly Total	..	..	218·12	403·14	..	5 16 3 21	6 10 2 21

* When the *number of tanks* is given, the flow was too slow and irregular to estimate it by the average time taken to fill the gauge-tank, and therefore the actual number of tankfuls was counted.

Table V.—*continued.*

Detailed Record of the Sewage applied, and of the Amounts of Green Produce obtained in Experiments on Italian Rye-grass.

Season 1863.

Dates.	Average time * taken to fill Gauge-tank (3·308 tons).	Time of application.	Sewage applied (calculated per acre). Plot 2. (Area 0·999 acre.)	Sewage applied (calculated per acre). Plot 3. (Area 0·99831 acre.)	Green Grass obtained (calculated per acre). Without Sewage. Plot 1. (Area 1·00484 acre.)	Green Grass obtained (calculated per acre). With Sewage. Plot 2. (Area 0·999 acre.)	Green Grass obtained (calculated per acre). With Sewage. Plot 3. (Area 0·99831 acre.)
		H. M.	Tons.	Tons.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.
					3rd Crop.		
August 1	(4·00tnks.)	..	13·25	..	0 5 3 2	..	0 8 2 2
3	(0·83 „)	..	..	2·75	0 6 0 5	..	0 5 0 3
4	(4·00 „)	..	13·25	..	0 5 0 4	..	0 9 0 4
5	(3·00 „)	..	..	9·94	0 1 1 21	..	0 5 2 23
6	(5·65 „)	..	18·71	..	0 4 2 11	..	0 6 2 23
7	(3·48 „)	..	..	11·53	0 3 2 26	..	0 5 3 1
8	(4·41 „)	...	..	14·61	0 7 1 24	4th Crop.	0 9 3 26
10	(2·88 „)	..	9·54	..	0 3 3 0	0 5 3 15	0 1 2 0
11	(3·20 „)	..	10·60	..	0 2 2 4	0 4 1 16	[4 2 2 23]
12	(1·00 „)	..	..	3·31	[2 0 1 13]	0 2 0 12	Total 4th Crop.
13	(2·62 „)	..	..	8·68		..	
14	(2·60 „)	..	8·61	..	Total 3d Crop.	..	..
15	(3·25 „)	..	..	10·77		..	..
17	(2·30 „)	..	7·62	..	..	..	..
18	(1·00 „)	..	..	3·31	..	..	..
20	(5·64 „)	..	..	18·69	..	..	..
21	(3·40 „)	..	11·26	..	..	..	..
22	(3·30 „)	..	..	10·93	..	..	..
24	(3·15 „)	..	10·43	..	..	0 2 2 20	..
25	(1·55 „)	..	..	5·14	..	0 5 2 21	..
26	(3·56 „)	..	..	11·80	..	0 4 3 0	..
27	(5·46 „)	..	..	18·09	..	0 6 3 21	..
28	(5·40 „)	..	..	17·89	..	0 1 3 20	..
29	(4·81 „)	..	..	15·94	..	[1 14 1 13]	5th Crop.
31	(5·30 „)	...	17·55	..	..	Total 4th Crop.	0 8 1 12
Monthly Total	..	..	120·82	163·38	2 0 1 13	1 14 1 13	3 0 2 10
Sept. 1	(5·11tnks.)	..	..	16·93	..	..	0 4 0 17
2	(4·45 „)	..	..	14·75	..	..	0 4 3 1
3	(3·45 „)	..	11·42	..	..	..	0 5 0 21
4	(5·34 „)	..	..	17·70	..	..	0 5 3 11
5	(3·81 „)	..	..	12·63	..	5th Crop.	0 9 1 7
7	(4·40 „)	..	14·57	..	..	0 1 3 4	0 2 3 10
8	(2·86 „)	..	..	9·48	4th Crop.	0 1 2 24	[2 0 1 23]
9	(2·90 „)	..	..	9·61	0 2 1 19	..	Total 5th Crop.
10	(5·61 „)	..	..	18·59	0 4 0 8	..	
11	(2·31 „)	..	..	7·65	0 3 0 8	..	
12	(2·46 „)	..	8·15	..	[0 9 2 7]	..	..
15	(4·40 „)	..	..	14·58		..	..
16	(1·86 „)	..	..	6·16	Total 4th Crop.	..	..
17	(2·73 „)	..	9·01	..		..	..
18	(3·60 „)	..	..	11·93	..	..	..
19	(1·50 „)	..	4·97	..	..	..	..
21	(3·98 „)	..	..	13·19	..	..	..
22	(3·33 „)	..	..	11·03	..	0 4 2 14	..
23	(1·60 „)	..	5·30	..	..	0 4 2 10	..
24	(3·45 „)	...	..	11·43	..	0 0 2 10	..
25	(4·00 „)	..	..	13·25	..	[0 13 1 6]	..
26	(2·00 „)	..	6·62	..	..		..
28	(4·44 „)	..	..	14·71	..	Total 5th Crop.	..
29	(3·00 „)	..	..	9·94	..		..
30	(1·90 „)	..	..	6·30	..	..	..
Monthly Total	..	..	60·07	219·86	0 9 2 7	0 13 1 6	1 12 0 11

* When the *number of tanks* is given, the flow was too slow and irregular to estimate it by the average time taken to fill the gauge-tank, and therefor the actual number of tankfuls was counted.

TABLE V.—*continued.*

Detailed Record of the Sewage applied, and of the Amounts of Green Produce obtained in Experiments on Italian Rye-grass.

Season 1863.

DATES.	Average time* taken to fill Gauge-tank (3·308 tons).	Time of application.	Sewage applied (calculated per acre). Plot 2. (Area 0·999 acre.)	Sewage applied (calculated per acre). Plot 3. (Area 0·99831 acre.)	Green Grass obtained (calculated per acre). Without Sewage. Plot 1. (Area 1·00184 acre.)	Green Grass obtained (calculated per acre). With Sewage. Plot 2. (Area 0·999 acre.)	Green Grass obtained (calculated per acre). With Sewage. Plot 3. (Area 0·99831 acre.)
		H. M.	Tons.	Tons.	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*
Oct. 1	(7·28tnks.)	..	24·11	..	..	..	..
2	(2·50 „)	..	..	8·28	..	..	..
3	(3·80 „)	..	12·58	..	..	..	..
5	(4·32 „)	..	..	14·32	..	..	..
6	(3·55 „)	..	..	11·76	..	..	..
7	(1·87 „)	..	6·19	..	..	..	..
8	(5·37 „)	..	..	17·79	..	..	..
9	(7·16 „)	..	..	23·73	..	..	..
10	(4·60 „)	..	15·23	..	..	..	..
15	..	..	..	..	..	..	6th Crop. 0 17 2 3
16	..	..	..	..	..	..	0 11 0 2
17	..	..	..	..	..	6th Crop. 0 12 2 1	0 14 2 7
21	..	..	..	..	..	0 13 1 15	[2 3 0 12] Total 6th Crop.
23	..	..	..	..	5th Crop. 0 6 0 9 Total 5th Crop.	[1 5 3 16] Total 6th Crop.	
Monthly Total	..	..	58·11	75·88	0 6 0 9	1 5 3 16	2 3 0 12

* When the *number of tanks* is given, the flow was too slow and irregular to estimate it by the average time taken to fill the gauge-tank, and therefore the actual number of tankfuls was counted.

Table VI.

Detailed Record of Food consumed, and Increase yielded, by Oxen fed on Unsewaged and Sewaged Meadow Grass, with Oilcake in addition. Season 1862.

28 days, from May 8 to June 5.

Dates of weighing.	Two Oxen on Unsewaged Grass. Grass. From Field.	Plot.*	Crop.	Quantities (weighed green). tons. cwts. qrs. lbs.	Oil-cake.† lbs.	Eight Oxen on Sewaged Grass. Grass. From Field.	Plot.	Crop.	Quantities (weighed green). tons. cwts. qrs. lbs.	Oil-cake.† lbs.
1862.										
May 8	Five-acre	00	1	0 1 2 11	6	Five-acre	4	1	0 8 0 15	24
9	,,	00	1	0 2 0 11	6	,,	4	1	0 8 2 14	24
10	,,	4	1	0 2 0 17	6	,,	4	1	0 9 2 9	24
11	,,	4	1	0 2 0 17	6	,,	4	1	0 9 2 9	24
12	,,	4	1	0 2 0 14	6	,,	4	1	0 11 1 11	24
13	,,	4	1	0 2 0 24	6	,,	4	1	0 9 3 0	24
14	,,	4	1	0 2 1 6	6	,,	4	1	0 9 3 22	24
15	,,	4	1	0 2 1 17	6	,,	4	1	0 10 1 6	24
16	,,	00	1	0 2 0 14	6	,,	4	1	0 11 2 1	24
17	,,	4	1	0 2 0 12	6	,,	4	1	0 10 2 21	24
18	,,	4	1	0 2 0 11	6	,,	4	1	0 10 2 21	24
19	,,	4	1	0 2 0 24	6	,,	4	1	0 12 0 27	24
20	,,	4	1	0 2 1 11	6	,,	4	1	0 10 1 8	24
21	,,	4	1	0 2 1 22	6	,,	4	1	0 10 3 15	24
22	,,	00	1	0 2 2 6	6	,,	3	1	0 9 3 6	24
23	,,	00	1	0 2 0 14	6	,,	3	1	0 9 0 7	24
24	,,	00	1	0 2 0 11	6	,,	3	1	0 10 3 10	24
25	,,	3	1	0 2 0 14	6	,,	3	1	0 10 3 9	24
26	,,	3	1	0 2 0 27	6	,,	3	1	0 11 1 15	24
27	,,	00	1	0 2 3 16	6	,,	3	1	0 10 2 1	24
28	,,	00	1	0 2 3 8	6	,,	3	1	0 9 2 26	24
29	,,	0	1	0 2 0 4	6	,,	3	1	0 8 2 13	24
30	,,	0	1	0 2 1 0	6	,,	3	1	0 9 0 23	24
31	,,	0	1	0 2 0 18	6	,,	3	1	0 8 3 22	24
June 1	,,	0	1	0 2 0 20	6	,,	3	1	0 8 3 22	24
2	,,	0	1	0 2 1 13	6	,,	3	1	0 9 3 1	24
3	,,	0	1	0 2 2 16	6	,,	3	1	0 8 0 14	24
4	,,	0	1	0 2 1 1	6	,,	3	1	0 9 0 7	24
Total in 28 days	-	-	-	3 3 0 15	168	Total in 28 days	-	-	13 18 1 19	672
Average per head per day			-	0 1 0 14	3	Average per head per day			0 1 0 27	3

Weights and Increase of the Oxen, &c.

Nos.	Two Oxen: Weights.‡ May 8.	June 5.	Increase in 28 days.	Per 1,000 lbs. live-weight per week. Food consumed. Grass.	Oilcake.	Increase in weight.	Eight Oxen: Weights. May 8.	June 5.	Increase in 28 days.	Per 1,000 lbs. live-weight per week. Food consumed. Grass.	Oilcake.	Increase in weight.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
1	1,129	1,234	105	715	$17\frac{1}{4}$	23·9	1,230	1,318	88	836	18	24·4
2	1,130	1,252	122				1,141	1,232	91			
3	..	..	..	..	..	..	1,073	1,186	113			
4	..	..	..	..	..	..	1,168	1,316	148			
5	..	..	..	..	..	..	1,136	1,252	116			
6	..	..	..	..	..	..	1,066	1,170	104			
7	..	..	..	..	..	..	1,050	1,152	102			
8	..	..	..	..	..	..	1,005	1,152	147			
Totals	2,259	2,486	227	..	..	..	8,869	9,778	909	..	..	..
Means	1,130	1,243	113	..	..	..	1,109	1,222	114	..	..	..

* Plot "0" is unmeasured land without sewage, and Plot "00" unmeasured land with sewage.
† Equal parts linseed cake and rape cake.
‡ Until May 29th, the two oxen received sewaged grass, the unsewaged not being ready for cutting until that date, at which time the animals weighed 1,225 lbs. and 1,255 lbs. respectively.

TABLE VI.—*continued.*

Detailed Record of Food consumed, and Increase yielded, by Oxen fed on Unsewaged and Sewaged Meadow Grass, with Oilcake in addition.

Season 1862.

28 days, from June 5 to July 3.

Dates of weighing.	Two Oxen on Unsewaged Grass.								Eight Oxen on Sewaged Grass.							
	Particulars of the Food consumed.															
	Grass							Oil-cake.†	Grass							Oil-cake.†
	From			Quantities (weighed green).					From			Quantities (weighed green).				
	Field.	Plot.*	Crop.	*tons.*	*cwts.*	*qrs.*	*lbs.*	*lbs.*	Field.	Plot.*	Crop.	*tons.*	*cwts.*	*qrs.*	*lbs.*	*lbs.*
1862.																
June 5	Five-acre	0	1	0	2	0	2	6	Five-acre	3	1	0	7	3	25	24
6	,,	0	1	0	1	3	5	6	,,	4	1	0	9	1	21	24
7	,,	0	1	0	1	3	26	6	,,	4	1	0	7	3	0	24
8	,,	0	1	0	2	0	0	6	,,	4	1	0	7	3	0	24
9	,,	0	1	0	2	0	1	6	,,	4	1	0	7	3	22	24
10	,,	0	1	0	2	0	20	6	,,	4	1	0	10	3	0	24
11	,,	0	1	0	2	1	9	6	,,	4	1	0	8	1	13	24
12	,,	0	1	0	2	1	12	6	,,	4	1	0	9	2	27	24
13	,,	0	1	0	2	1	9	6	,,	4	1	0	9	3	3	24
14	,,	0	1	0	1	3	11	6	,,	4	1	0	6	3	2	24
15	,,	0	1	0	1	3	13	6	,,	4	1	0	6	3	4	24
16	,,	0	1	0	2	2	7	6	,,	4	1	0	8	2	20	24
17	,,	0	1	0	2	1	11	6	,,	4	1	0	8	1	25	24
18	,,	0	1	0	2	1	1	6	,,	4	1	0	8	1	17	24
19	,,	0	1	0	2	0	9	6	,,	3	1	0	7	3	23	24
20	,,	0	1	0	2	0	23	6	,,	3	1	0	8	2	25	24
21	,,	0	1	0	2	0	2	6	,,	3	1	0	7	1	27	24
22	,,	0	1	0	2	0	4	6	,,	3	1	0	7	2	4	24
23	,,	0	1	0	2	0	1	6	,,	3	1	0	5	3	12	24
24	,,	0	1	0	2	0	2	6	,,	2	1	0	11	0	9	24
25	,,	0	1	0	1	2	14	6	,,	2	1	0	8	0	5	24
26	,,	0	1	0	1	3	9	6	,,	2	1	0	7	1	14	24
27	,,	0	1	0	2	0	8	6	,,	00	1	0	6	3	13	24
28	,,	1	1	0	2	0	1	6	,,	2	1	0	6	3	8	24
29	,,	1	1	0	2	0	0	6	,,	2	1	0	6	3	14	24
30	,,	1	1	0	2	1	5	6	,,	2	1	0	7	3	8	24
July 1	,,	1	1	0	1	3	14	6	,,	2	1	0	8	2	4	24
2	,,	1	1	0	1	3	24	6	,,	2	1	0	7	1	22	24
Total in 28 Days - -				2	17	3	19	168	Total in 28 days - -			11	7	0	3	672
Average per head per day -				0	1	0	4	3	Average per head per day			0	1	0	2	3

WEIGHTS AND INCREASE OF THE OXEN, &c.

Nos.	Two Oxen: Weights.		Increase in 28 days.	Per 1,000 lbs. live-weight per week.			Eight Oxen: Weights.		Increase in 28 days.	Per 1,000 lbs. live-weight per week.		
				Food consumed.		Increase in weight.				Food consumed.		Increase in weight.
	June 5.	July 3.		Grass.	Oilcake.		June 5.	July 3.		Grass.	Oilcake.	
	lbs.	*lbs.*	*lbs.*	*lbs.*	*lbs.*	*lbs.*	*lbs.*	*lbs.*	*lbs.*	*lbs.*	*lbs.*	*lbs.*
1	1,234	1,276	42	636	16½	12·6	1,318	1,402	84	629	16¾	15·9
2	1,252	1,338	86				1,232	1,330	98			
3	..	..	..	..	..	..	1,186	1,290	104			
4	..	..	..	..	..	..	1,316	1,390	74			
5	..	..	..	..	..	..	1,252	1,328	76			
6	..	..	..	..	..	..	1,170	1,220	50			
7	..	..	..	..	..	..	1,152	1,205	53			
8	..	..	..	..	..	..	1,152	1,256	104			
Totals	2,486	2,614	128	..	..	..	9,778	10,421	643	..	..	..
Means	1,243	1,307	64	..	..	..	1,222	1,302	80	..	..	..

* Plot "0" is unmeasured land without sewage, and Plot "00" unmeasured land with sewage.
† Equal parts linseed cake and rape cake.

TABLE VI.—*continued.*

Detailed Record of Food consumed, and Increase yielded, by Oxen fed on Unsewaged and Sewaged Meadow Grass, with Oilcake in addition.

Season 1862.

28 days, from July 3 to July 31.

Dates of weighing.	Two Oxen on Unsewaged Grass. Particulars of the Food consumed. Grass. From Field.	Plot.*	Crop.	Quantities (weighed green). tons.	cwts.	qrs.	lbs.	Oil-cake.†	Eight Oxen on Sewaged Grass. Grass. From Field.	Plot.*	Crop.	Quantities (weighed green). tons.	cwts.	qrs.	lbs.	Oil-cake.†
1862.								lbs.								lbs.
July 3	Five-acre	1	1	0	1	3	4	6	Five-acre	2	1	0	7	2	15	24
4	,,	0	1	0	1	3	9	6	,,	00 & 2	1	0	8	0	18	24
5	,,	1	1	0	2	0	18	6	,,	2	1	0	7	1	8	24
6	,,	1	1	0	2	0	20	6	,,	2	1	0	7	1	13	24
7	,,	1	1	0	2	0	13	6	,,	2	1	0	8	0	21	24
8	,,	1	1	0	2	0	8	6	,,	00,2 & 4	1 & 2	0	8	1	18	24
9	,,	1	1	0	2	0	19	6	,,	2	1	0	6	2	10	24
10	,,	1	1	0	1	3	6	6	,,	2	1	0	6	2	27	24
11	,,	1	1	0	2	0	15	6	,,	2	1	0	6	3	10	24
12	,,	1	1	0	2	1	9	6	,,	2	1	0	8	1	16	24
13	,,	1	1	0	2	1	8	6	,,	2	1	0	8	1	16	24
14	,,	1	1	0	2	1	0	6	,,	2	1	0	7	3	15	24
15	,,	1	1	0	1	3	15	6	,,	2	1	0	7	2	21	24
16	,,	1	1	0	1	3	14	6	,,	2	1	0	5	3	17	24
17	,,	1	1	0	1	3	11	6	,,	2	1	0	6	2	5	24
18	,,	1	1	0	1	3	21	6	,,	2	1	0	8	0	10	24
19	,,	1	1	0	1	3	10	6	,,	2	1	0	5	3	9	24
20	,,	1	1	0	1	3	14	6	,,	2	1	0	5	3	9	24
21	,,	1	1	0	1	3	10	6	,,	2	1	0	5	2	17	24
22	,,	1	1	0	1	3	4	6	,,	2	1	0	5	1	16	24
23	,,	1	1	0	1	3	4	6	,,	4	2	0	8	1	6	24
24	,,	1	1	0	2	0	9	6	,,	4	2	0	8	0	14	24
25	,,	1	1	0	1	3	8	6	,,	4	2	0	9	2	25	24
26	,,	1	1	0	1	3	11	6	,,	4	2	0	7	2	0	24
27	,,	1	1	0	1	3	14	6	,,	4	2	0	7	2	0	24
28	,,	1	1	0	1	3	19	6	,,	4	2	0	8	3	11	24
29	,,	1	1	0	1	2	5	6	,,	4	2	0	8	1	24	24
30	,,	1	1	0	1	2	2	6	,,	4	2	0	8	0	12	24
Total in 28 days				2	14	1	20	168	Total in 28 days			10	9	1	18	672
Average per head per day				0	0	3	25	3	Average per head per day			0	0	3	21	3

WEIGHTS AND INCREASE OF THE OXEN, &c.

Nos.	Weights. July 3.	July 31	Increase in 28 days.	Per 1,000 lbs. live-weight per week. Food consumed. Grass.	Oilcake.	Increase in weight.	Weights. July 3.	July 31.	Increase (or loss) in 28 days.	Per 1,000 lbs. live-weight per week. Food consumed. Grass.	Oilcake.	Increase in weight.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
1	1,276	1,332	56	570	15¼	11·0	1,402	1,426	24	556	16	5·6
2	1,338	1,400	62				1,330	1,328	− 2			
3	..	..	..	..	..	..	1,290	1,288	− 2			
4	..	..	..	..	..	..	1,390	1,448	58			
5	..	..	..	..	..	..	1,328	1,372	44			
6	..	..	..	..	..	..	1,220	1,266	46			
7	..	..	..	..	..	..	1,205	1,242	37			
8	..	..	..	..	..	..	1,256	1,286	30			
Totals	2,614	2,732	118	..	..	..	10,421	10,656	235	..	..	..
Means	1,307	1,366	59	..	..	..	1,303	1,332	29	..	..	..

* Plot "0" is unmeasured land without sewage, and Plot "00" unmeasured land with sewage.
† Equal parts linseed cake and rape cake.

TABLE VI.—*continued.*

Detailed Record of Food consumed, and Increase yielded, by Oxen fed on Unsewaged and Sewaged Meadow Grass, with Oilcake in addition.

Season 1862.

28 days, from July 31 to August 28.

Dates of weighing.	Two Oxen on Unsewaged Grass. Particulars of the Food consumed. Grass. From Field.	Plot.*	Crop.	Quantities (weighed green). *tons.*	*cwts.*	*qrs.*	*lbs.*	Oil-cake.† *lbs.*	Eight Oxen on Sewaged Grass. Particulars of the Food consumed. Grass. From Field.	Plot.	Crop.	Quantities (weighed green). *tons.*	*cwts.*	*qrs.*	*lbs.*	Oil-cake.† *lbs.*
July 31	Five-acre	1	1	0	1	1	20	6	Five-acre	4	2	0	6	2	3	24
Aug. 1	,,	1	1	0	1	2	13	6	,,	4	2	0	8	0	27	24
2	,,	1	1	0	1	1	7	6	,,	4	2	0	10	0	16	24
3	,,	1	1	0	1	1	6	6	,,	3	2	0	9	0	8	24
4	,,	1	1	0	1	1	9	6	,,	3	2	0	8	0	18	24
5	,,	1	1	0	1	2	4	6	,,	3	2	0	8	2	15	24
6	,,	1	1	0	1	3	5	6	,,	3	2	0	9	3	20	24
7	,,	1	1	0	1	2	12	6	,,	3	2	0	11	2	8	24
8	,,	1	1	0	1	1	21	6	,,	3	2	0	9	0	22	24
9	,,	1	1	0	1	3	1	6	,,	3	2	0	9	0	6	24
10	,,	1	1	0	1	3	0	6	,,	3	2	0	9	0	6	24
11	,,	1	1	0	1	1	27	6	,,	3	2	0	8	2	16	24
12	,,	1	1	0	1	0	17	6	,,	3	2	0	8	3	13	24
13	,,	1	1	0	1	1	9	6	,,	3	2	0	8	3	2	24
14	,,	1	1	0	2	1	3	6	,,	3	2	0	11	2	7	24
15	,,	1	1	0	1	2	0	6	,,	3	2	0	8	1	13	24
16	,,	1	1	0	1	0	21	6	,,	3	2	0	8	1	26	24
17	,,	1	1	0	1	0	23	6	,,	3	2	0	8	2	0	24
18	,,	1	1	0	1	3	3	6	,,	3	2	0	11	0	25	24
19	,,	1	1	0	1	2	1	6	,,	3	2	0	9	0	21	24
20	,,	1	1	0	1	2	3	6	,,	3	2	0	9	1	20	24
21	,,	0	1	0	1	0	19	6	,,	3	2	0	7	2	21	24
22	,,	0	1	0	1	1	7	6	,,	2	2	0	9	3	22	24
23	,,	0	1	0	1	0	9	6	,,	2	2	0	9	1	18	24
24	,,	0	1	0	1	0	12	6	,,	2	2	0	9	1	23	24
25	,,	0	1	0	1	0	5	6	,,	2	2	0	8	1	14	24
26	,,	0	1	0	1	0	6	6	,,	2	2	0	9	2	9	24
27	,,	0	1	0	1	0	2	6	,,	2	2	0	10	0	13	24
Total in 28 days		-	-	1	19	2	13	168	Total in 28 days	-	-	12	17	0	20	672
Average per head per day			-	0	0	2	23	3	Average per head per day			0	1	0	17	3

WEIGHTS AND INCREASE OF THE OXEN, &c.

Nos.	Weights. July 31.	Weights. Aug. 28.	Increase in 28 days.	Per 1,000 lbs. live-weight per week. Food consumed. Grass.	Oilcake.	Increase in weight.	Weights. July 31.	Weights. Aug. 28.	Increase (or loss) in 28 days.	Per 1,000 lbs. live-weight per week. Food consumed. Grass.	Oilcake.	Increase (or loss) in weight.
	lbs.	*lbs.*	*lbs.*	*lbs.*	*lbs.*	*lbs.*	*lbs.*	*lbs.*	*lbs.*	*lbs.*	*lbs.*	*lbs.*
1	1,332	1,374	42	399	15	9·0	1,426	1,420	– 6			
2	1,400	1,458	58				1,328	1,272	–56			
3	..	..	..	..	..	..	1,288	1,290	2			
4	..	..	..	..	..	..	1,448	1,458	10	677	15¾	–1·1
5	..	..	..	..	..	..	1,372	1,386	14			
6	..	..	..	..	..	..	1,266	1,273	7			
7	..	..	..	..	..	..	1,242	1,240	– 2			
8	..	..	..	..	..	..	1,286	1,272	–14			
Totals	2,732	2,832	100	..	..	..	10,656	10,611	–45	..	..	..
Means	1,366	1,416	50	..	..	..	1,332	1,326	– 6	..	..	..

* Plot "0" is unmeasured land without sewage.

† Equal parts linseed cake and rape cake.

Table VI.—*continued.*

Detailed Record of Food consumed, and Increase yielded, by Oxen fed on Unsewaged and Sewaged Meadow Grass, with Oilcake in addition.

Season 1862.

28 days, from August 28 to September 25.

Dates of weighing.	Two Oxen on Unsewaged Grass. Particulars of the Food consumed. Grass. From Field.	Plot.*	Crop.	Quantities (weighed green). tons.	cwts.	qrs.	lbs.	Oil-cake.† lbs.	Eight Oxen on Sewaged Grass. Grass. From Field.	Plot.*	Crop.	Quantities (weighed green). tons.	cwts.	qrs.	lbs.	Oil-cake.† lbs.
1862. Aug. 28	Five-acre	0	1	0	0	3	25	8	Five-acre	2	2	0	9	0	20	32
29	,,	0	1	0	1	0	8	8	,,	2	2	0	8	2	15	32
30	,,	0	2	0	1	3	3	8	,,	2	2	0	9	2	25	32
31	,,	0	2	0	1	3	5	8	,,	2	2	0	9	3	2	32
Sept. 1	,,	0	2	0	1	3	3	8	,,	00 & 2	2	0	11	3	13	32
2	,,	0	2	0	1	3	8	8	,,	2	2	0	10	2	20	32
3	,,	0	2	0	1	3	13	8	,,	2	2	0	10	3	0	32
4	,,	0	2	0	1	3	16	8	,,	2	2	0	9	3	25	32
5	,,	0	2	0	1	3	15	8	,,	2	2	0	9	3	26	32
6	,,	0	2	0	1	3	8	8	,,	2	2	0	9	3	0	32
7	,,	0	2	0	1	3	10	8	,,	2	2	0	9	3	3	32
8	,,	0	2	0	1	3	1	8	,,	2	2	0	7	0	20	32
9	,,	0	2	0	1	3	12	8	,,	00	2	0	9	0	9	32
10	,,	0	2	0	1	3	15	8	,,	00	2	0	9	0	26	32
11	,,	0	2	0	1	3	17	8	,,	00 & 4	2 & 3	0	9	1	3	32
12	,,	0	2	0	1	3	18	8	,,	4	3	0	10	0	15	32
13	,,	0	2	0	1	3	2	8	,,	4	3	0	8	3	22	32
14	,,	0	2	0	1	3	1	8	,,	4	3	0	8	3	10	32
15	,,	0	2	0	1	2	23	8	,,	4	3	0	11	0	3	32
16	,,	0	2	0	1	2	20	8	,,	4	3	0	10	1	11	32
17	,,	0	2	0	1	2	15	8	,,	4	3	0	11	1	4	32
18	,,	0	2	0	1	3	2	10	,,	4	3	0	11	2	15	40
19	,,	0	2	0	1	2	13	10	,,	4	3	0	10	3	15	40
20	,,	0	2	0	1	3	3	10	,,	4	3	0	8	3	19	40
21	,,	0	2	0	1	3	6	10	,,	4	3	0	8	3	19	40
22	,,	0	2	0	1	3	7	10	,,	4	3	0	9	3	17	40
23	,,	0	2	0	1	3	16	10	,,	4	3	0	8	3	10	40
24	,,	0	2	0	1	2	21	10	,,	4	3	0	10	0	1	40
Total in 28 days	-	-	-	2	8	2	26	238	Total in 28 days	-	-	13	14	2	4	952
Average per head per day			-	0	0	3	13	4¼	Average per head per day			0	1	0	25	4¼

Weights and Increase of the Oxen, &c.

Nos.	Weights. Aug. 28.	Weights. Sep. 25.‡	Increase (or loss) in 28 days.	Per 1,000 lbs. live-weight per week. Food consumed. Grass.	Food consumed. Oilcake.	Increase in weight.	Weights. Aug. 28.	Weights. Sep. 25.‡	Increase in 28 days.	Per 1,000 lbs. live-weight per week. Food consumed. Grass.	Food consumed. Oilcake.	Increase in weight.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
	1,374	1,414	40	479	20¾	3·3	1,420	1,508	88			
	1,458	1,456	—2				1,272	1,425	153			
3	..	..	..	..	..	..	1,290	1,408	118			
4	..	..	..	..	..	..	1,458	1,524	66			
5	..	..	..	..	..	..	1,386	1,468	82	700	21¾	16·7
6	..	..	..	..	..	..	1,273	1,334	61			
7	..	..	..	..	..	..	1,240	1,310	70			
8	..	..	..	..	..	..	1,272	1,369	97			
Totals	2,832	2,870	38	..	..	..	10,611	11,316	735	..	..	..
Means	1,416	1,435	19	..	..	..	1,326	1,418	92	..	..	..

* Plot "0" is unmeasured land without sewage, and Plot "00" unmeasured land with sewage.

† Linseed cake only, excepting on August 28 and 29, on which days a mixture of linseed cake and rape cake was given.

‡ These weights were in fact, for convenience, taken on September 26, but in the calculations are supposed to apply to September 25.

Table VI.—*continued.*

Detailed Record of Food consumed, and Increase yielded, by Oxen fed on Unsewaged and Sewaged Meadow Grass, with Oilcake in addition.

Season 1862.

18 days, from September 25 to October 13.

Dates of weighing.	Two Oxen on Unsewaged Grass. Particulars of the Food consumed. Grass. From Field.	Plot.*	Crop.	Quantities (weighed green). tons.	cwts.	qrs.	lbs.	Oil-cake.† lbs.	Eight Oxen on Sewaged Grass. Particulars of the Food consumed. Grass. From Field	Plot.*	Crop.	Quantities (weighed green). tons.	cwts.	qrs.	lbs.	Oil-cake.† lbs.
1862. Sept. 25	Five-acre	0	2	0	1	3	24	12	Five-acre	4	3	0	11	1	2	48
26	,,	0	2	0	1	3	3	12	,,	4	3	0	9	3	3	48
27	,,	0	2	0	1	2	19	12	,,	4	3	0	8	3	21	48
28	,,	0	2	0	1	2	21	12	,,	4	3	0	8	3	26	48
29	,,	0	2	0	1	3	23	12	,,	4	3	0	10	1	6	48
30	,,	0	2	0	1	3	20	12	,,	4	3	0	10	0	1	48
Oct. 1	,,	0	2	0	1	3	23	12	,,	3	3	0	13	0	16	48
2	,,	0	2	0	2	0	6	12	,,	3	3	0	9	2	23	48
3	,,	0	2	0	1	3	3	12	,,	2 & 3	3	0	12	0	11	48
4	,,	1	2	0	1	3	17	12	,,	2	3	0	8	3	5	48
5	,,	1	2	0	1	3	20	12	,,	2	3	0	8	3	10	48
6	,,	1	2	0	1	3	11	12	,,	00 & 2	2 & 3	0	10	0	8	48
7	,,	1	2	0	1	3	8	12	,,	2	3	0	11	0	11	48
8	,,	1	2	0	1	3	9	12	,,	2	3	0	9	0	22	48
9	,,	1	2	0	1	3	9	12	,,	2	3	0	9	1	3	48
10	,,	1	2	0	1	3	24	12	,,	2	3	0	9	1	11	48
11	,,	1	2	0	1	3	6	12	,, ‡	2	3	0	7	2	16	48
12	,,	1	2	0	1	3	8	12	,, ‡	..	..	0	7	2	16	48
13	Five-acre	1	2	0	1	3	7	16	Five-acre‡	00	3	0	11	0	13	64
14	,,	1	2	0	1	3	14	16	,,	4	4	0	9	2	7	64
15	,,	1	2	0	1	3	8	16	,,	4	4	0	8	2	2	64
16	,,	1	2	0	1	3	11	16	,,	4	4	0	8	3	23	64
Total in 18 days (to Oct. 13) -				1	13	2	2	216	Total in 18 days (to Oct. 13)			8	16	0	15	864
Average per head per day -				0	0	3	20	6	Average per head per day			0	1	0	25	6

Weights and Increase of the Oxen, &c.

Nos.	Two Oxen: Weights. Sept. 25. §	Oct. 13.	Increase (or loss) in 18 days.	Per 1,000 lbs. live-weight per week. Food consumed. Grass.	Oilcake.	Increase (or loss) in weight.	Eight Oxen: Weights. Sept. 25. §	Oct. 13.	Increase (or loss) in 18 days.	Per 1,000 lbs. live-weight per week. Food consumed. Grass.	Oilcake.	Increase (or loss) in weight.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
1	1,414	1,356	−58	515	$29\frac{3}{4}$	−10·3	1,508	1,488	−20	681	$29\frac{3}{4}$	−5·6
2	1,456	1,439	−17				1,425	1,378	−47			
3	..	..	..	..	..	..	1,408	1,414	6			
4	..	..	..	..	..	..	1,524	1,531	7			
5	..	..	..	..	..	..	1,468	1,442	−26			
6	..	..	..	..	..	..	1,334	1,332	− 2			
7	..	..	..	..	..	..	1,310	1,288	−22			
8	..	..	..	..	..	..	1,369	1,311	−58			
Totals	2,870	2,795	−75	..	..	..	11,346	11,184	−162	..	..	..
Means	1,435	1,397	−38	..	..	..	1,418	1,398	−20	..	..	..

* Plot "0" is unmeasured land without sewage, and plot "00" unmeasured land with sewage.

† Linseed cake.

‡ On October 11, 2 cwts. 0 qrs. 12 lbs., on October 12, the whole quantity, viz. 7 cwts. 2 qrs. 16 lbs., and on October 13, 8 cwts. 2 qrs. 23 lbs. of the grass came from another (not experimental) field.

§ These weights were in fact, for convenience, taken on September 26, but in the calculations are supposed to apply to September 25.

TABLE VII.

SUMMARY of the WEIGHTS and INCREASE of the OXEN fed respectively on UNSEWAGED and SEWAGED MEADOW GRASS, with OILCAKE in addition.

SEASON 1862.

—	Weights.								Increase in Weight.					
									May 8 to Oct. 13 = 22 4/7 weeks.‡			June 5 to Oct. 13 = 18 4/7 weeks.§		
	May 8.*	May 29.*	June 5.	July 3.	July 31.	Aug. 28.	Sept. 25.†	Oct. 13.	Total.	Per head per week.	Per 1,000 lbs. live-weight per week.	Total.	Per head per week.	Per 1,000 lbs. live-weight per week.
Two Oxen on Unsewaged Grass.														
	lbs.	*lbs.*	*lbs.*	*lbs.*	*lbs.*	*lbs.*	*lbs.*	*lbs.*	*lbs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs.*	*lbs. ozs.*	*lbs. ozs.*
1	1,129	1,225	1,234	1,276	1,332	1,374	1,414	1,356	227	10 1	8 2	122	6 9	5 1
2	1,130	1,255	1,252	1,338	1,400	1,458	1,456	1,439	309	13 11	10 11	187	10 1	7 8
Totals -	2,259	2,480	2,486	2,614	2,732	2,832	2,870	2,795	536	—	—	309	—	—
Averages -	1,130	1,240	1,243	1,307	1,366	1,416	1,435	1,398	268	11 14	9 6	155	8 5	6 5
Eight Oxen on Sewaged Grass.														
1	1,230	—	1,318	1,402	1,426	1,420	1,508	1,488	258	11 7	8 7	170	9 2	6 8
2	1,141	—	1,232	1,330	1,328	1,272	1,425	1,378	237	10 8	8 5	146	7 14	6 0
3	1,073	—	1,186	1,290	1,288	1,290	1,408	1,414	341	15 2	12 2	228	12 4	9 7
4	1,168	—	1,316	1,390	1,448	1,458	1,524	1,531	363	16 1	11 14	215	11 9	8 2
5	1,136	—	1,252	1,328	1,372	1,386	1,468	1,442	306	13 9	10 8	190	10 4	7 10
6	1,066	—	1,170	1,220	1,266	1,273	1,334	1,332	266	11 13	9 13	162	8 12	7 0
7	1,050	—	1,152	1,205	1,242	1,240	1,310	1,288	238	10 9	9 0	136	7 5	6 0
8	1,005	—	1,152	1,256	1,286	1,272	1,369	1,311	306	13 9	11 11	159	8 9	6 15
Totals -	8,869	—	9,778	10,421	10,656	10,611	11,346	11,184	2,315	—	—	1,406	—	—
Averages -	1,109	—	1,222	1,303	1,332	1,326	1,418	1,398	289	12 13	10 4	176	9 7	7 4

* Both lots of animals were weighed on May 8, but as the unsewaged grass was not ready to cut until May 29, the 2 animals were then re-weighed.
† Sept. 25 was the proper day of weighing, but as a matter of convenience, it did not, in fact, take place until Sept. 26.
‡ This period includes the first 3 weeks during which the 2 oxen, otherwise fed on unsewaged grass, received sewaged grass.
§ This period excludes the first month of the experiment during 3 weeks of which the 2 oxen, otherwise fed on unsewaged grass, received sewaged grass.

TABLE VIII.

SUMMARY of FOOD CONSUMED and INCREASE YIELDED by the OXEN fed on UNSEWAGED and SEWAGED MEADOW GRASS, with OILCAKE in addition.

SEASON 1862.

Periods.		Two Oxen on Unsewaged Grass.						Eight Oxen on Sewaged Grass.					
		Food consumed.				Increase (or Loss) in Weight.		Food consumed.				Increase (or Loss) in Weight.	
Dates.	Number of Weeks.	Per head per week.		Per 1,000 lbs. live-weight per week.		Per head per week.	Per 1000 lbs. live-weight per week.	Per head per week.		Per 1,000 lbs. live-weight per week.		Per head per week.	Per 1,000 lbs. live-weight per week.
		Grass.	Oilcake.	Grass.	Oilcake.			Grass.	Oilcake.	Grass.	Oilcake.		
		lbs.	*lbs.*	*lbs.*	*lbs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs.*	*lbs.*	*lbs.*	*lbs.*	*lbs. ozs.*	*lbs. ozs.*
May 8 to June 5 - -	4	884	21	745	$17\frac{3}{4}$	28 6	23 15	974	21	836	18	28 6	24 6
June 5 to July 3 -	4	811	21	636	$16\frac{1}{2}$	16 0	12 9	795	21	629	$16\frac{3}{4}$	20 2	15 15
July 3 to July 31 - -	4	762	21	570	$15\frac{3}{4}$	14 12	11 1	733	21	556	16	7 6	5 9
July 31 to Aug. 28 -	4	555	21	399	15	12 8	9 0	900	21	677	$15\frac{3}{4}$	−1 6	−1 1
Aug. 28 to Sept 25 -	4	682	$29\frac{3}{4}$	479	$20\frac{3}{4}$	4 12	3 5	961	$29\frac{3}{4}$	700	$21\frac{3}{4}$	23 0	16 12
Sept. 25 to Oct. 13 -	$2\frac{4}{7}$	730	42	515	$29\frac{3}{4}$	−14 9	−10 5	959	42	681	$29\frac{3}{4}$	−7 14	−5 9
May 8 to Oct. 13 * -	$22\frac{4}{7}$	738	25	584	$19\frac{3}{4}$	11 14	9 6	882	25	704	20	12 13	10 4
June 5 to Oct 13 † -	$18\frac{4}{7}$	706	$25\frac{3}{4}$	535	$19\frac{1}{2}$	8 5	6 5	863	$25\frac{3}{4}$	658	$19\frac{3}{4}$	9 7	7 4

* This period includes the first 3 weeks during which the 2 oxen, otherwise fed on unsewaged grass, received sowaged grass.
† This period excludes the first month of the experiment during 3 weeks of which the 2 oxen, otherwiso fed on unsewaged grass, received sewaged grass.

DETAILED RECORD OF FOOD consumed, and MILK yielded, by Cows fed on the UNSEWAGED and SEWAGED MEADOW GRASS, with OILCAKE in addition.
SECOND SEASON, 1862; 7 days.—May 2 to May 8.

THREE COWS.—UNSEWAGED GRASS.

Food consumed	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Total in 7 days	Per head per day
Grass: From which Field, Plot, and Crop	*	*	*	*	*	*	*	—	—
Grass: Quantities weighed (tons, cwts, qrs, lbs)	0 3 1 0	0 4 0 6	0 4 2 14	0 4 2 14	0 4 0 0	0 4 0 4	0 4 0 0	1 8 2 10	0 1 1 12
Oilcake (equal parts linseed and rape cake) (tons, cwts, qrs, lbs)	0 0 0 9	0 0 0 9	0 0 0 9	0 0 0 9	0 0 0 9	0 0 0 9	0 0 0 9	0 0 2 7	0 0 0 3

Yield of Milk, &c. (lbs. ozs.)

Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (May 1). lbs.	Fri. A.M.	Fri. P.M.	Sat. A.M.	Sat. P.M.	Sun. A.M.	Sun. P.M.	Mon. A.M.	Mon. P.M.	Tues. A.M.	Tues. P.M.	Wed. A.M.	Wed. P.M.	Thurs. A.M.	Thurs. P.M.	Total in 7 days	Per head per day
1	Cross Sht.-horn	6	Mar. 20	945	14 6	12 8	16 4	11 4	20 0	11 14	21 5	14 10	20 0	12 5	20 8	14 10	22 0	17 7	229 1	32 12
2	Cross Sht.-horn	7	Dec. 25	976	13 12	12 8	13 2	13 2	18 12	12 8	16 14	11 11	13 0	10 14	16 2	12 3	15 10	13 4	193 9	27 10
3	Cross Sht.-horn	Aged	Feb. 26	884	16 14	15 10	19 6	15 0	18 12	15 0	20 0	13 12	20 2	14 11	21 12	15 13	19 6	15 0	241 2	34 7
			Totals -	2,805	45 0	40 10	48 12	39 6	57 8	39 6	58 3	40 4	53 2	37 14	58 6	42 10	57 0	45 11	663 12	—
			Means -	935	15 0	13 9	16 4	13 2	19 3	13 2	19 6	13 7	17 11	12 10	19 7	14 3	19 0	15 4	221 4	31 10

TWELVE COWS.—SEWAGED GRASS.

Food consumed	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Total in 7 days	Per head per day
Grass: From which Field, Plot, and Crop	Ten-acre, Plot 4, Crop 1.	Ten-acre, Plot 4, Crop 1.	Ten-acre, Plot 4, Crop 1.	Ten-acre, Plot 4, Crop 1.	Ten-acre, Plot 4, Crop 1.	Ten-acre, Plot 4, Crop 1.	Ten-acre, Plot 3, Crop 1.	—	—
Grass: Quantities weighed (tons, cwts, qrs, lbs)	0 13 1 23	0 12 3 23	0 10 3 23	0 11 0 0	0 17 1 23	0 17 2 23	0 16 0 14	4 19 2 17	0 1 0 21
Oilcake (equal parts linseed and rape cake) (tons, cwts, qrs, lbs)	0 0 1 8	0 0 1 8	0 0 1 8	0 0 1 8	0 0 1 8	0 0 1 8	0 0 1 8	0 2 1 0	0 0 0 3

Yield of Milk, &c. (lbs. ozs.)

Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (May 1). lbs.	Fri. A.M.	Fri. P.M.	Sat. A.M.	Sat. P.M.	Sun. A.M.	Sun. P.M.	Mon. A.M.	Mon. P.M.	Tues. A.M.	Tues. P.M.	Wed. A.M.	Wed. P.M.	Thurs. A.M.	Thurs. P.M.	Total in 7 days	Per head per day
1	Cross Sht.-horn	6	Nov. 18	1,143	12 8	8 2	12 8	10 0	15 0	10 0	13 8	10 1	13 1	9 8	13 14	10 6	13 10	13 0	165 2	23 9
2	Cross Sht.-horn	8	Feb. 2	1,138	12 8	10 10	13 2	10 10	18 2	10 10	15 10	11 1	15 1	11 0	14 15	9 6	15 12	11 0	179 7	25 10
3	Cross Sht.-horn	6	Dec. 1	1,076	14 6	8 12	13 12	11 4	15 0	9 6	13 2	9 13	13 6	10 8	14 4	10 4	13 8	11 10	168 15	24 2
4	Cross Sht.-horn	Aged	Jan. 26	966	16 14	11 14	16 4	13 2	18 2	11 4	16 14	11 9	17 0	13 10	15 15	11 12	15 10	12 9	202 7	28 15
5	Cross Sht.-horn	6	Nov. 17	1,076	13 12	13 2	13 12	11 4	16 14	11 14	12 8	11 2	13 0	11 10	14 13	9 4	13 0	11 4	177 3	25 5
6	Cross Sht.-horn	Aged	Jan. 13	1,006	14 6	11 4	13 12	11 14	18 2	10 10	15 10	10 4	14 12	11 2	15 10	10 15	15 1	11 11	185 1	26 7
7	Cross Sht.-horn	8	Apr. 28	1,126	24 6	18 12	23 12	20 0	25 10	18 2	25 0	18 1	26 2	19 6	28 5	19 3	28 0	19 8	314 3	44 14
8	Cross Ayrshire	3	Apr. 13	723	15 10	10 0	15 10	12 8	16 14	9 6	15 0	8 14	13 14	9 6	15 1	9 8	13 14	10 13	176 6	25 3
9	Cross Sht.-horn	Aged	Feb. 16	965	13 12	9 6	13 12	10 0	18 2	8 12	16 4	9 14	14 14	10 5	14 3	9 14	14 10	11 0	174 12	24 15
10	Ayrshire -	6	Apr. 3	866	18 12	14 6	18 2	17 8	20 10	13 12	21 4	13 7	21 2	14 13	20 15	13 9	20 4	17 0	245 8	35 1
11	Guernsey -	4	Mar. 30	781	16 14	10 10	16 4	16 4	15 0	12 8	16 14	12 9	17 14	12 14	16 9	12 5	15 10	14 0	206 3	29 7
12	Cross Sht.-horn	7	Nov. 16	984	15 0	9 6	15 0	7 8	15 0	9 6	15 0	12 4	16 0	11 10	16 5	10 14	12 11	12 0	178 0	25 7
			Totals -	11,850	188 12	136 4	185 10	151 14	212 8	135 10	196 10	138 15	196 2	145 12	200 13	137 4	191 10	155 7	2,373 3	—
			Means -	988	15 12	11 6	15 8	12 10	17 11	11 5	16 6	11 9	16 6	12 2	16 12	11 7	15 15	12 15	197 12	28 4

* Rye-grass.

Table IX.—*continued*.

Detailed Record of Food consumed, and Milk yielded, by Cows fed on the Unsewaged and Sewaged Meadow Grass, with Oilcake in addition. Second Season, 1862; 7 days.—May 9 to May 15.

THREE COWS.—UNSEWAGED GRASS.

Food consumed.	Friday.	Saturday.	Sunday.	Monday.	Tuesday.	Wednesday.	Thursday.	Total in 7 days.	Per head per day.
Grass: From which Field, Plot, and Crop.	*	*	*	*	*	*	*	—	—
	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.
Grass: Quantities weighed	0 3 1 4	0 5 0 0	0 4 2 10	0 4 2 9	0 5 0 14	0 5 0 14	0 2 0 0	1 9 2 23	0 1 1 18
Oilcake (equal parts linseed and rape cake)	0 0 0 9	0 0 0 9	0 0 0 9	0 0 0 9	0 0 0 9	0 0 0 9	0 0 0 9	0 0 2 7	0 0 0 3

Yield of Milk, &c.

Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (May 15†) lbs.	Friday A.M. lbs. ozs.	Friday P.M. lbs. ozs.	Saturday A.M. lbs. ozs.	Saturday P.M. lbs. ozs.	Sunday A.M. lbs. ozs.	Sunday P.M. lbs. ozs.	Monday A.M. lbs. ozs.	Monday P.M. lbs. ozs.	Tuesday A.M. lbs. ozs.	Tuesday P.M. lbs. ozs.	Wednesday A.M. lbs. ozs.	Wednesday P.M. lbs. ozs.	Thursday A.M. lbs. ozs.	Thursday P.M. lbs. ozs.	Total in 7 days lbs. ozs.	Per head per day lbs. ozs.
1	Cross Sht.-horn	6	Mar. 20	966	22 7	13 5	21 10	13 3	19 15	13 0	21 4	12 7	19 0	12 15	19 7	15 11	20 6	11 13	236 7	33 12
2	Cross Sht.-horn	7	Dec. 25	1,004	13 1	12 0	14 6	11 4	14 1	10 8	14 6	11 10	14 7	11 12	13 0	12 15	16 4	10 5	179 15	25 11
3	Cross Sht.-horn	Aged	Feb. 26	896	19 8	15 6	20 9	14 0	22 0	13 0	20 8	12 2	20 8	11 11	21 10	15 11	20 12	12 5	239 10	34 4
			Totals -	2,866	55 0	40 11	56 9	38 7	56 0	36 8	56 2	36 3	53 15	36 6	54 1	44 5	57 6	34 7	656 0	—
			Means -	955	18 5	13 10	18 14	12 13	18 11	12 3	18 11	12 1	17 15	12 2	18 0	14 12	19 2	11 8	218 11	31 4

TWELVE COWS.—SEWAGED GRASS.

Food consumed.	Friday.	Saturday.	Sunday.	Monday.	Tuesday.	Wednesday.	Thursday.	Total in 7 days.	Per head per day.
Grass: From which Field, Plot, and Crop.	Ten-acre, Plot 3, Crop 1.	Ten-acre, Plot 3, Crop 1.	Ten-acre, Plot 3, Crop 1.	Ten-acre, Plot 3, Crop 1.	Ten-acre, Plot 2, Crop 1.	Ten-acre, Plot 4, Crop 1.	Ten-acre, Plot 4, Crop 1.	—	—
	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.
Grass: Quantities weighed	0 13 1 23	1 0 1 23	0 19 1 1	0 19 1 1	0 16 2 24	1 0 2 9	1 1 1 2	6 10 3 27	0 1 2 7
Oilcake (equal parts linseed and rape cake)	0 0 1 8	0 0 1 8	0 0 1 8	0 0 1 8	0 0 1 8	0 0 1 8	0 0 1 8	0 2 1 0	0 0 0 3

Yield of Milk, &c.

Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (May 1). lbs.	Friday A.M. lbs. ozs.	Friday P.M. lbs. ozs.	Saturday A.M. lbs. ozs.	Saturday P.M. lbs. ozs.	Sunday A.M. lbs. ozs.	Sunday P.M. lbs. ozs.	Monday A.M. lbs. ozs.	Monday P.M. lbs. ozs.	Tuesday A.M. lbs. ozs.	Tuesday P.M. lbs. ozs.	Wednesday A.M. lbs. ozs.	Wednesday P.M. lbs. ozs.	Thursday A.M. lbs. ozs.	Thursday P.M. lbs. ozs.	Total in 7 days lbs. ozs.	Per head per day lbs. ozs.
1	Cross Sht.-horn	6	Nov. 18	1,143	14 8	9 11	14 3	10 10	14 1	10 6	15 8	9 0	13 8	11 2	13 12	9 8	13 14	11 0	170 11	24 6
2	Cross Sht.-horn	8	Feb. 2	1,138	15 0	9 8	12 7	10 2	13 4	9 0	12 10	8 0	12 0	10 10	13 10	10 1	12 4	9 0	157 8	22 8
3	Cross Sht.-horn	6	Dec. 1	1,076	14 1	9 13	12 9	10 14	13 1	11 2	13 12	9 0	12 8	10 8	12 10	10 1	13 6	9 6	162 11	23 4
4	Cross Sht.-horn	Aged	Jan. 26	966	15 10	10 14	14 6	11 8	14 13	9 8	14 11	9 8	13 7	11 0	15 6	11 1	15 0	10 0	176 12	25 4
5	Cross Sht.-horn	6	Nov. 17	1,076	12 10	10 10	12 0	10 9	13 0	11 0	11 12	8 12	10 12	9 15	12 4	9 4	12 3	10 8	155 3	22 3
6	Cross Sht.-horn	Aged	Jan. 13	1,006	15 10	9 13	14 10	11 6	15 6	9 11	15 2	10 0	14 2	10 6	15 1	10 7	15 4	9 4	176 2	25 3
7	Cross Sht.-horn	8	Apr. 28	1,126	26 9	17 4	26 0	18 1	26 4	18 6	20 4	16 0	22 14	17 5	23 8	18 2	23 0	16 11	290 4	41 7
8	Cross Ayrshire	3	Apr. 13	723	14 4	8 15	14 2	9 4	14 1	9 7	13 10	9 0	13 8	9 13	13 14	9 4	13 0	9 0	161 2	23 0
9	Cross Sht.-horn	Aged	Feb. 16	965	14 0	10 5	14 6	9 9	14 2	9 2	14 4	8 4	13 14	10 6	12 8	11 12	12 8	9 4	164 4	23 7
10	Ayrshire	6	Apr. 3	866	21 2	14 4	20 8	14 5	20 8	14 6	20 4	12 12	19 0	15 4	20 13	14 11	20 7	13 15	242 3	34 10
11	Guernsey	4	Mar. 30	781	16 3	11 7	17 0	12 0	17 4	12 10	15 8	11 0	15 0	12 2	15 10	12 8	13 15	10 11	192 14	27 9
12	Cross Sht.-horn	7	Nov. 16	984	14 2	9 13	12 9	10 14	14 10	10 8	13 10	8 10	14 4	10 9	15 2	11 1	15 11	10 0	171 7	24 8
			Totals -	11,850	193 11	132 5	184 12	139 2	190 6	135 2	180 15	119 14	174 13	139 0	184 2	137 12	180 8	128 11	2,221 1	—
			Means -	988	16 2	11 0	15 6	11 10	15 14	11 4	15 1	10 0	14 9	11 9	15 6	11 8	15 1	10 11	185 1	26 7

Detailed Record of Food consumed, and Milk yielded, by Cows fed on the Unsewaged and Sewaged Meadow Grass, with Oilcake in addition. Second Season, 1862; 7 days.—May 16 to May 22.

					Friday.		Saturday.		Sunday.		Monday.		Tuesday.		Wednesday.		Thursday.		Total in 7 days.	Per head per day.
Three Cows.—Unsewaged Grass.																				
Food consumed. Grass	From which Field, Plot, and Crop.				Ten-acre, Plot 0,* Crop 1.		Ten-acre, Plot 0,* Crop 1.		Ten-acre, Plot 0,* Crop 1.		Ten-acre, Plot 0,* Crop 1.		Ten-acre, Plot 0,* Crop 1.		Ten-acre, Plot 0,* Crop 1.		Ten-acre, Plot 0,* Crop 1.		—	—
					tons. cwts. qrs. lbs.		tons. cwts. qrs. lbs.		tons. cwts. qrs. lbs.		tons. cwts. qrs. lbs.		tons. cwts. qrs. lbs.		tons. cwts. qrs. lbs.		tons. cwts. qrs. lbs.		tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.
	Quantities weighed - - -				0 5 0 9½		0 5 3 0½		0 5 1 25½		0 5 2 0		0 6 3 27½		0 4 3 20½		0 4 3 19½		1 18 2 19	0 1 3 10
Oilcake	(equal parts linseed and rape cake) -				0 0 0 9		0 0 0 9		0 0 0 9		0 0 0 9		0 0 0 9		0 0 0 9		0 0 0 9		0 0 2 7	0 0 0 3
Yield of Milk, &c. Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (May 15) lbs.	A.M. lbs. ozs.	P.M. lbs. ozs.	A.M. lbs. ozs.	P.M. lbs. ozs.	A.M. lbs. ozs.	P.M. lbs. ozs.	A.M. lbs. ozs.	P.M. lbs. ozs.	A.M. lbs. ozs.	P.M. lbs. ozs.	A.M. lbs. ozs.	P.M. lbs. ozs.	A.M. lbs. ozs.	P.M. lbs. ozs.	lbs. ozs.	lbs. ozs.
1	Cross Sht.-horn	6	Mar. 20	966	16 10	12 2	18 11	13 4	19 7	14 11	19 12	13 4	17 6	13 12	19 8	12 4	16 13	12 8	220 0	31 7
2	Cross Sht.-horn	7	Dec. 25	1,004	15 4	11 4	14 14	10 9	14 0	13 11	12 11	10 4	12 10	10 0	12 9	9 5	14 8	10 12	172 5	24 10
3	Cross Sht.-horn	Aged	Feb. 26	896	22 2	14 4	20 12	13 8	19 14	10 12	17 10	13 12	18 2	13 3	19 12	13 4	18 13	12 13	228 9	32 10
	Totals		-	2,866	54 0	37 10	54 5	37 5	53 5	39 2	50 1	37 4	48 2	36 15	51 13	34 13	50 2	36 1	620 14	—
	Means		-	955	18 0	12 9	18 2	12 7	17 12	13 1	16 11	12 7	16 1	12 5	17 4	11 9	16 11	12 0	206 15	29 9
Twelve Cows.—Sewaged Grass.																				
Food consumed. Grass	From which Field, Plot, and Crop.				Ten-acre, Plot 4, Crop 1.		Ten-acre, Plot 4, Crop 1.		Ten-acre, Plot 3, Crop 1.		Ten-acre, Plot 3, Crop. 1.		Ten-acre, Plot 3, Crop 1.		Ten-acre, Plot 4, Crop 1.		Ten-acre, Plots 4, 3, & 00,* Crop 1.		—	—
					tons. cwts. qrs. lbs.		tons. cwts. qrs. lbs.		tons. cwts. qrs. lbs.		tons. cwts. qrs. lbs.		tons. cwts. qrs. lbs.		tons. cwts. qrs. lbs.		tons. cwts. qrs. lbs.		tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.
	Quantities weighed - - -				0 13 1 23		0 15 3 21		0 15 3 23		0 15 0 15		0 14 1 23		0 15 2 23		0 19 2 6		5 10 0 22	0 1 1 7
Oilcake	(equal parts linseed and rape cake) -				0 0 1 8		0 0 1 8		0 0 1 8		0 0 1 8		0 0 1 8		0 0 1 8		0 0 1 8		0 2 1 0	0 0 0 3
Yield of Milk, &c. Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (May 1) lbs.	A.M. lbs. ozs.	P.M. lbs. ozs.	A.M. lbs. ozs.	P.M. lbs. ozs.	A.M. lbs. ozs.	P.M. lbs. ozs.	A.M. lbs. ozs.	P.M. lbs. ozs.	A.M. lbs. ozs.	P.M. lbs. ozs.	A.M. lbs. ozs.	P.M. lbs. ozs.	A.M. lbs. ozs.	P.M. lbs. ozs.	lbs. ozs.	lbs. ozs.
1	Cross Sht.-horn	6	Nov. 18	1,143	13 10	9 5	13 11	11 0	13 4	11 6	13 2	9 5	12 0	10 2	14 0	8 14	13 14	9 15	163 8	23 6
2	Cross Sht.-horn	8	Feb. 2	1,138	12 6	10 4	12 14	10 12	13 10	11 6	13 12	9 3	12 4	10 0	15 4	8 15	13 2	9 10	163 6	23 5
3	Cross Sht.-horn	6	Dec. 1	1,076	11 0	10 4	14 0	9 11	11 14	11 0	13 14	9 9	11 10	10 3	13 12	9 11	13 0	9 11	159 3	22 12
4	Cross Sht.-horn	Aged	Jan. 26	966	14 8	9 12	14 7	11 11	15 2	12 0	14 13	8 10	13 6	10 9	15 8	10 6	14 6	10 2	175 4	25 1
5	Cross Sht.-horn	6	Nov. 17	1,076	10 6	9 9	12 13	11 8	12 6	12 2	12 8	8 10	11 0	11 13	12 0	8 11	12 2	10 2	155 10	22 4
6	Cross Sht.-horn	Aged	Jan. 13	1,006	13 6	10 4	14 7	9 15	14 12	12 2	14 0	10 8	13 8	10 15	11 1	9 5	14 8	10 4	168 15	24 2
†7	Cross Sht.-horn	8	Apr. 28	1,126	22 0	15 3	20 6	13 5	17 0	13 5	4 8	3 2	0 0	18 10	25 2	16 13	23 12	16 11	209 13	30 0
8	Cross Ayrshire	3	Apr. 13	723	12 7	8 12	13 6	9 3	13 4	9 3	12 5	7 10	12 8	8 13	12 8	7 13	12 11	8 4	148 11	21 4
9	Cross Sht.-horn	Aged	Feb. 16	965	13 4	10 11	14 5	9 15	12 12	11 11	14 7	8 7	13 6	9 14	13 10	9 15	14 0	10 3	165 8	23 13
10	Ayrshire -	6	Apr. 3	866	19 10	13 8	20 14	13 15	20 7	14 5	20 7	11 6	17 10	14 7	19 4	14 0	20 0	13 5	233 2	33 5
11	Guernsey -	4	Mar. 30	781	16 0	12 4	15 8	10 5	15 0	9 7	16 3	8 12	14 14	11 8	15 8	12 12	15 8	10 10	184 3	26 5
12	Cross Sht.-horn	7	Nov. 16	984	16 12	9 2	17 11	10 1	14 12	11 12	15 0	10 0	13 12	10 14	16 3	10 2	14 6	10 1	180 8	25 13
	Totals		-	11,850	175 5	128 14	184 6	131 5	174 3	139 11	164 15	105 2	145 14	137 12	183 12	127 5	181 5	128 14	2,108 11	—
	Means		-	986	14 10	10 12	15 6	10 15	14 8	11 10	13 12	8 12	12 2	11 8	15 5	10 10	15 2	10 12	175 12	25 2

* Unmeasured land; designated Plot 0 when unsewaged, and Plot 00 when sewaged.
† This (No. 7) cow fell ill and was substituted by another, weighing 1,112 lbs., on Tuesday, May 20.

Table IX.—*continued.*

Detailed Record of Food consumed, and Milk yielded, by Cows fed on the Unsewaged and Sewaged Meadow Grass, with Oilcake in addition.

Second Season, 1862 ; 7 days.—May 23 to May 29.

Three Cows.—Unsewaged Grass.

Food consumed. (tons. cwts. qrs. lbs.)

—	Friday.	Saturday.	Sunday.	Monday.	Tuesday.	Wednesday.	Thursday.	Total in 7 days.	Per head per day.
Grass: From which Field, Plot, and Crop.	Ten-acre, Plot 0,* Crop 1.	—	Ten-acre, Plot 0,* Crop 1.	Ten-acre, Plot 0,* Crop 1.	Ten-acre, Plot 0,* Crop 1.	Ten-acre, Plot 0,* Crop 1.	—	—	—
Grass: Quantities weighed	0 7 2 15½	..	0 4 0 15½	0 4 0 18	0 6 1 3¾	0 7 1 13½	..	1 9 2 10	0 1 1 18
Oilcake (equal parts linseed and rape-cake)	0 0 0 9	0 0 0 9	0 0 0 9	0 0 0 9	0 0 0 9	0 0 0 9	0 0 0 9	0 0 2 7	0 0 0 3

Yield of Milk, &c. (lbs. ozs.)

Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (May 29). lbs.	Friday A.M.	Friday P.M.	Saturday A.M.	Saturday P.M.	Sunday A.M.	Sunday P.M.	Monday A.M.	Monday P.M.	Tuesday A.M.	Tuesday P.M.	Wednesday A.M.	Wednesday P.M.	Thursday A.M.	Thursday P.M.	Total in 7 days.	Per head per day.
1	Cross Sht.-horn	6	Mar. 20	1,042	17 10	13 13	19 11	10 8	18 10	13 6	17 7	12 9	17 3	14 13	17 3	11 5	18 2	13 4	218 8	31 3
2	Cross Sht.-horn	7	Dec. 25	1,051	15 2	10 8	12 9	8 12	12 7	11 13	12 8	10 15	11 4	12 5	12 13	12 2	12 13	11 4	167 3	23 14
3	Cross Sht.-horn	Aged	Feb. 26	948	20 0	13 6	19 7	12 2	19 4	13 6	19 6	13 2	18 2	15 14	19 3	14 12	17 3	17 0	232 3	33 3
	Totals -			3,044	52 12	37 11	51 11	31 6	50 5	38 9	49 5	36 10	46 9	43 0	49 3	41 3	48 2	41 8	617 14	—
	Means -			1,015	17 9	12 9	17 4	10 8	16 12	12 14	16 7	12 3	15 8	14 5	16 6	13 12	16 1	13 13	205 15	29 7

Twelve Cows.—Sewaged Grass.

Food consumed. (tons. cwts. qrs. lbs.)

—	Friday.	Saturday.	Sunday.	Monday.	Tuesday.	Wednesday.	Thursday.	Total in 7 days.	Per head per day.
Grass: From which Field, Plot, and Crop.	Ten-acre, Plot 3, Crop 1.	Five-acre, Plot 3, Crop 1.	Five-acre, Plot 3, Crop 1.	Five-acre, Plot 3, Crop 1.	Five-acre, Plot 3, Crop 1.	Five-acre, Plot 2, Crop 1.	Ten-acre, Plot 2, Crop 1.	—	—
Grass: Quantities weighed	0 15 2 23	1 7 2 0	0 10 0 23	0 10 0 24	0 18 0 16	0 17 0 5	0 16 3 9	5 15 2 16	0 1 1 14
Oilcake (equal parts linseed and rape-cake)	0 0 1 8	0 0 1 8	0 0 1 8	0 0 1 8	0 0 1 8	0 0 1 8	0 0 1 8	0 2 1 0	0 0 0 3

Yield of Milk, &c. (lbs. ozs.)

Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (May 29). lbs.	Friday A.M.	Friday P.M.	Saturday A.M.	Saturday P.M.	Sunday A.M.	Sunday P.M.	Monday A.M.	Monday P.M.	Tuesday A.M.	Tuesday P.M.	Wednesday A.M.	Wednesday P.M.	Thursday A.M.	Thursday P.M.	Total in 7 days.	Per head per day.
1	Cross Sht.-horn	6	Nov. 18	1,178	13 0	9 4	12 6	9 2	11 2	10 9	11 8	9 14	12 4	10 11	13 6	10 10	13 6	10 14	158 0	22 9
2	Cross Sht.-horn	8	Feb. 2	1,208	12 7	10 5	13 8	10 4	11 12	11 5	12 3	9 8	12 3	10 10	13 4	9 6	12 12	9 0	158 7	22 10
3	Cross Sht.-horn	6	Dec. 1	1,153	12 11	10 0	13 4	10 1	11 14	9 6	12 4	9 13	11 8	9 6	12 8	9 12	12 5	10 6	155 2	22 3
4	Cross Sht.-horn	Aged	Jan. 26	972	13 8	9 15	13 6	10 11	13 6	9 6	12 14	10 3	13 10	11 3	14 0	10 12	13 10	10 10	167 2	23 14
5	Cross Sht.-horn	6	Nov. 17	1,107	13 10	10 3	13 0	9 6	12 13	11 6	11 0	9 13	12 1	11 11	12 2	10 8	12 0	10 13	160 6	22 15
6	Cross Sht.-horn	Aged	Jan. 13	1,096	14 6	10 5	14 13	10 7	13 6	9 14	15 1	9 6	13 2	10 10	14 4	11 1	14 2	10 6	171 3	24 7
†7	Cross Sht.-horn	6	May 2	1,068	23 4	16 13	23 8	16 14	21 0	17 6	21 4	16 0	21 1	17 5	22 0	18 2	22 4	15 12	272 9	38 15
8	Cross Ayrshire	3	Apr. 13	785	13 0	8 9	13 0	8 10	11 8	8 9	11 0	8 0	11 8	8 10	11 8	8 12	11 6	8 1	142 1	20 5
9	Cross Sht.-horn	Aged	Feb. 16	1,018	14 1	10 14	14 0	12 7	14 2	10 11	13 1	9 12	12 0	11 0	13 10	10 6	13 7	9 8	168 15	24 2
10	Ayrshire -	6	Apr. 3	950	20 6	14 10	20 0	14 6	18 12	14 4	18 2	13 13	18 0	15 4	19 8	14 2	19 6	15 6	235 15	33 11
11	Guernsey -	4	Mar. 30	835	15 0	10 10	15 10	11 12	14 10	11 10	13 8	10 11	14 8	12 2	14 8	12 1	14 6	12 4	183 4	26 3
12	Cross Sht.-horn	7	Nov. 16	1,090	14 7	10 0	15 13	9 6	13 8	10 8	13 4	9 7	13 4	11 7	14 5	10 15	13 12	10 4	170 4	24 5
	Totals -			12,460	179 12	131 8	182 4	133 6	167 13	134 14	165 1	126 4	165 1	139 15	174 15	136 7	172 12	133 4	2,143 4	—
	Means -			1,038	15 0	10 15	15 3	11 2	14 0	11 4	13 12	10 8	13 12	11 11	14 9	11 6	14 6	11 2	178 10	25 8

† [illegible] original No. 7 cow falling ill, it was replaced by this cow on May 20.

... Meadow Grass, with Oilcake in addition.

Second Season, 1862 ; 7 days.—May 30 to June 5.

THREE COWS.—UNSEWAGED GRASS.

Food consumed (tons. cwts. qrs. lbs.)

—	Friday.	Saturday.	Sunday.	Monday.	Tuesday.	Wednesday.	Thursday.	Total in 7 days.	Per head per day.
Grass: From which Field, Plot, and Crop	Ten-acre, Plots0*&1,Crop1.	—	Ten-acre, Plot 1, Crop 1.	Ten-acre, Plot 1, Crop 1.	Ten-acre, Plot 1, Crop 1.	Ten-acre, Plot 1, Crop 1.	Ten acre, Plot 1, Crop 1.	—	—
Grass: Quantities weighed	0 5 1 19½	– – – –	0 4 2 14	0 4 2 12½	0 5 1 1½	0 5 0 4½	0 3 2 10½	1 8 2 6½	0 1 1 12
Oilcake (equal parts linseed and rape cake)	0 0 0 9	0 0 0 9	0 0 0 9	0 0 0 9	0 0 0 9	0 0 0 9	0 0 0 9	0 0 2 7	0 0 0 3

Yield of Milk, &c. (lbs. ozs.)

Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (May 29). lbs.	Friday A.M.	Friday P.M.	Saturday A.M.	Saturday P.M.	Sunday A.M.	Sunday P.M.	Monday A.M.	Monday P.M.	Tuesday A.M.	Tuesday P.M.	Wednesday A.M.	Wednesday P.M.	Thursday A.M.	Thursday P.M.	Total in 7 days.	Per head per day.
1	Cross Sht.-horn	6	Mar. 20	1,042	19 0	13 2	19 12	13 11	17 10	11 8	17 10	14 1	16 6	13 7	16 8	12 8	15 9	12 5	213 1	30 7
2	Cross Sht.-horn	7	Dec. 25	1,054	12 7	11 1	10 8	11 11	13 0	10 4	11 8	12 4	12 8	11 0	10 4	12 12	10 8	11 6	161 1	23 0
3	Cross Sht.-horn	Aged	Feb. 26	948	17 1	17 1	20 2	12 9	17 14	12 8	17 14	14 0	17 4	12 2	18 6	12 13	17 8	11 12	218 14	31 4
			Totals -	3,044	48 8	41 4	50 6	37 15	48 8	34 4	47 0	40 5	46 2	36 9	45 2	38 1	43 9	35 7	593 0	—
			Means -	1,015	16 3	13 12	16 12	12 10	16 3	11 7	15 11	13 7	15 6	12 3	15 1	12 11	14 8	11 13	197 11	28 4

TWELVE COWS.—SEWAGED GRASS.

Food consumed (tons. cwts. qrs. lbs.)

—	Friday.	Saturday.	Sunday.	Monday.	Tuesday.	Wednesday.	Thursday.	Total in 7 days.	Per head per day.
Grass: From which Field, Plot, and Crop	Ten-acre, Plot 3, Crop 1.	Ten-acre, Plot 3, Crop 1.	Ten-acre, Plot 3, Crop 1.	Ten-acre, Plot 3, Crop 1.	Ten-acre, Plot 3, Crop 1.	Ten-acre, Plot 3, Crop 1.	Ten-acre, Plot 3, Crop 1.	—	—
Grass: Quantities weighed	0 16 3 22	1 1 2 9	0 17 0 1	0 17 0 0	0 13 2 23	0 13 3 4	0 7 1 21	5 7 1 24	0 1 1 3
Oilcake (equal parts linseed and rape cake)	0 0 1 8	0 0 1 8	0 0 1 8	0 0 1 8	0 0 1 8	0 0 1 8	0 0 1 8	0 2 1 0	0 0 0 3

Yield of Milk, &c. (lbs. ozs.)

Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (May 29). lbs.	Friday A.M.	Friday P.M.	Saturday A.M.	Saturday P.M.	Sunday A.M.	Sunday P.M.	Monday A.M.	Monday P.M.	Tuesday A.M.	Tuesday P.M.	Wednesday A.M.	Wednesday P.M.	Thursday A.M.	Thursday P.M.	Total in 7 days.	Per head per day.
1	Cross Sht.-horn	6	Nov. 18	1,178	13 1	10 3	12 14	9 5	12 2	9 8	12 10	11 15	12 6	9 8	11 12	9 4	11 12	9 4	155 8	22 3
2	Cross Sht.-horn	8	Feb. 2	1,208	12 2	9 4	11 4	9 10	12 14	9 0	11 14	11 7	11 12	9 6	12 0	9 2	12 2	9 3	151 0	21 9
3	Cross Sht.-horn	6	Dec. 1	1,153	11 13	9 5	12 6	9 0	11 12	9 7	11 6	11 1	11 9	8 13	11 9	9 0	11 4	8 12	147 1	21 0
4	Cross Sht.-horn	Aged	Jan. 26	972	14 2	10 6	13 10	9 7	12 4	10 0	12 4	11 8	12 7	9 4	11 6	8 3	11 8	8 1	156 6	22 5
5	Cross Sht.-horn	6	Nov. 17	1,107	12 0	9 10	11 0	8 12	10 0	9 10	11 0	11 7	10 0	9 8	9 8	8 5	9 4	8 1	138 1	19 12
6	Cross Sht.-horn	Aged	Jan. 13	1,096	14 4	10 10	14 1	9 4	12 6	10 11	13 2	12 4	12 14	10 0	13 14	9 4	12 6	9 11	164 11	23 8
7	Cross Sht.-horn	6	May 2	1,068	20 8	16 2	22 0	15 2	20 6	15 4	20 6	15 2	20 7	15 12	20 8	14 3	20 2	14 8	250 6	35 12
8	Cross Ayrshire	3	Apr. 13	785	11 9	8 3	11 6	8 0	11 0	8 0	9 13	9 10	10 7	7 4	10 3	7 4	10 4	6 15	129 14	18 9
9	Cross Sht.-horn	Aged	Feb. 16	1,018	12 4	10 7	11 8	8 14	11 2	9 12	11 12	9 12	12 13	9 0	11 8	10 8	12 8	8 13	150 9	21 8
10	Ayrshire -	6	Apr. 3	950	16 3	14 2	17 4	12 12	17 0	12 14	17 10	13 6	16 5	13 4	17 10	13 7	17 12	11 14	211 7	30 3
11	Guernsey -	4	Mar. 30	835	15 0	10 9	15 7	10 13	12 2	11 9	13 0	12 11	13 8	9 3	13 2	10 7	13 6	10 12	171 9	24 8
12	Cross Sht.-horn	7	Nov. 16	1,090	13 6	11 2	12 13	10 10	12 10	10 1	13 3	10 12	12 12	8 12	13 8	8 7	13 7	9 1	160 8	22 15
			Totals -	12,460	166 4	129 15	165 9	121 9	155 10	125 12	158 0	140 15	157 4	119 10	156 8	117 6	155 11	116 15	1,987 0	—
			Means -	1,038	13 14	10 13	13 13	10 2	12 15	10 8	13 3	11 12	13 2	9 15	13 1	9 12	12 15	9 12	165 9	23 11

* Unmeasured land, designated Plot 0 when unsewaged.

Table IX.—*continued.*

Detailed Record of Food consumed, and Milk yielded, by Cows fed on the Unsewaged and Sewaged Meadow Grass, with Oilcake addition.

Second Season 1862; 7 days.—June 6 to June 12.

Three Cows.—Unsewaged Grass.

Food consumed (tons. cwts. qrs. lbs.)

—	Friday.	Saturday.	Sunday.	Monday.	Tuesday.	Wednesday.	Thursday.	Total in 7 days.	Per head per day.
Grass: From which Field, Plot, and Crop.	—	Ten-acre, Plot 1, Crop 1.	Ten-acre, Plot 1, Crop 1.	Ten-acre, Plot 1, Crop 1.	Ten-acre, Plot 1, Crop 1.	Ten-acre, Plot 1, Crop 1.	Ten-acre, Plot 1, Crop 1.	—	—
Grass: Quantities weighed - - -	..	0 3 2 12½	0 4 0 15½	0 4 0 14	0 4 3 6½	0 4 3 0½	0 5 0 18½	1 6 2 11½	0 1 1 2
Oilcake (equal parts linseed and rape cake) -	0 0 0 9	0 0 0 9	0 0 0 9	0 0 0 9	0 0 0 9	0 0 0 9	0 0 0 9	0 0 2 7	0 0 0 3

Yield of Milk, &c. (lbs. ozs.)

Cows. Nos.	Breed.	Years old.	Dates of Calving	Weights (May 29). lbs.	Friday A.M.	Friday P.M.	Saturday A.M.	Saturday P.M.	Sunday A.M.	Sunday P.M.	Monday A.M.	Monday P.M.	Tuesday A.M.	Tuesday P.M.	Wednesday A.M.	Wednesday P.M.	Thursday A.M.	Thursday P.M.	Total in 7 days.	Per head per day.
1	Cross Sht.-horn	6	Mar. 20	1,042	15 12	13 0	16 4	12 6	16 3	10 14	16 2	11 6	16 0	11 14	16 10	12 10	16 3	13 1	198 5	28 5
2	Cross Sht.-horn	7	Dec. 25	1,054	10 4	11 2	10 8	11 10	10 8	13 4	11 10	10 14	10 1	10 8	10 10	13 6	10 14	12 0	157 3	22 7
3	Cross Sht.-horn	Aged	Feb. 26	948	16 4	12 2	17 0	11 15	15 8	11 6	16 0	11 9	16 9	12 1	16 8	12 11	16 7	12 15	198 15	28 7
			Totals -	3,044	42 4	36 4	43 12	35 15	42 3	35 8	43 12	33 13	42 10	34 7	43 12	38 11	43 8	38 0	554 7	—
			Means -	1,015	14 1	12 2	14 9	12 0	14 1	11 13	14 9	11 4	14 3	11 8	14 9	12 15	14 8	12 11	184 13	26 6

Twelve Cows.—Sewaged Grass.

Food consumed (tons. cwts. qrs. lbs.)

—	Friday.	Saturday.	Sunday.	Monday.	Tuesday.	Wednesday.	Thursday.	Total in 7 days.	Per head per day.
Grass: From which Field, Plot, and Crop.	Ten-acre, Plot 3, Crop 1.	Ten-acre, Plots 00* and 2, Crop 1.	Ten-acre, Plot 2, Crop 1.	Ten-acre, Plot 2, Crop 1.	Ten-acre, Plot 2, Crop 1,	Ten-acre, Plot 2, Crop 1.	Ten-acre, Plot 2, Crop 1.	—	—
Grass: Quantities weighed - - - -	0 10 2 4	0 15 2 8	0 14 2 16	0 14 2 17	0 13 0 11	0 18 3 9	1 1 0 23	5 8 2 4	0 1 1 5
Oilcake (equal parts linseed and rape cake) -	0 0 1 8	0 0 1 8	0 0 1 8	0 0 1 8	0 0 1 8	0 0 1 8	0 0 1 8	0 2 1 0	0 0 0 3

Yield of Milk, &c. (lbs. ozs.)

Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (May 29). lbs.	Friday A.M.	Friday P.M.	Saturday A.M.	Saturday P.M.	Sunday A.M.	Sunday P.M.	Monday A.M.	Monday P.M.	Tuesday A.M.	Tuesday P.M.	Wednesday A.M.	Wednesday P.M.	Thursday A.M.	Thursday P.M.	Total in 7 days.	Per head per day.
1	Cross Sht.-horn	6	Nov. 18	1,178	12 2	8 8	11 8	9 4	12 4	10 3	11 4	9 0	11 6	9 0	11 15	9 2	12 0	9 8	147 0	21 0
2	Cross Sht.-horn	8	Feb. 2	1,208	11 14	9 0	11 7	8 12	12 0	9 0	11 10	8 12	11 4	8 15	12 2	9 0	11 6	9 3	144 5	20 10
3	Cross Sht.-horn	6	Dec. 1	1,153	11 8	9 0	9 12	8 12	11 8	9 4	11 0	8 10	10 8	9 0	11 7	7 13	11 4	8 9	137 15	19 11
4	Cross Sht.-horn	Aged	Jan. 26	972	10 14	8 12	11 8	8 8	10 14	9 14	11 6	7 14	11 0	8 12	12 0	9 3	11 7	9 8	141 8	20 4
5	Cross Sht.-horn	6	Nov. 17	1,107	11 0	8 0	10 3	7 8	10 4	10 6	10 4	7 13	10 4	8 7	10 11	8 10	10 3	8 2	131 11	18 13
6	Cross Sht.-horn	Aged	Jan. 13	1,096	13 7	9 0	13 4	9 10	12 6	8 11	12 11	8 15	12 2	9 11	13 4	9 5	12 6	10 4	155 0	22 2
7	Cross Sht.-horn	6	May 2	1,068	20 11	14 6	20 4	15 0	19 8	15 11	19 3	14 11	19 0	15 4	20 12	15 5	20 0	15 11	245 6	35 1
8	Cross Ayrshire	3	Apl. 13	785	10 6	6 14	10 6	7 2	10 4	6 0	10 6	6 10	9 7	6 11	10 2	7 9	10 1	7 14	119 12	17 2
9	Cross Sht.-horn	Aged	Feb. 16	1,018	11 4	8 1	12 10	9 7	12 6	9 3	12 2	8 6	12 8	10 0	13 11	10 0	12 13	10 4	152 11	21 13
10	Ayrshire -	6	Apl. 3	950	17 2	12 13	17 0	12 4	15 8	13 4	16 4	11 15	17 2	13 5	19 0	13 4	18 0	13 6	210 3	30 0
11	Guernsey -	4	Mar. 30	835	13 4	10 0	13 4	10 9	13 8	10 13	10 15	10 1	12 13	10 10	12 13	11 3	12 14	9 12	162 7	23 3
12	Cross Sht.-horn	7	Nov. 16	1,090	13 7	9 0	12 14	8 13	12 11	8 12	14 4	9 2	12 12	9 11	14 2	9 10	13 6	9 10	158 2	22 9
					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	121 1	151 5	111 13	150 2	119 6	161 15	120 0	155 12	121 11	1,906 0	—

Second Season, 1862 ; 7 days.—June 13 to June 19.

Three Cows.—Unsewaged Grass.

Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (May 29). lbs.	Friday. A.M.	Friday. P.M.	Saturday. A.M.	Saturday. P.M.	Sunday. A.M.	Sunday. P.M.	Monday. A.M.	Monday. P.M.	Tuesday. A.M.	Tuesday. P.M.	Wednesday. A.M.	Wednesday. P.M.	Thursday. A.M.	Thursday. P.M.	Total in 7 days.	Per head per day.
Food consumed.	Grass: From which Field, Plot, and Crop.				Ten-acre, Plot 1, Crop 1.		Ten-acre, Plot 1, Crop 1.		Ten-acre, Plot 1, Crop 1.		Ten-acre, Plot 1, Crop 1.		Ten-acre, Plot 1, Crop 1.		Ten-acre, Plot 1, Crop 1.		Ten-acre, Plot 1, Crop 1.		—	—
					tons. cwts. qrs. lbs.		tons. cwts. qrs. lbs.		tons. cwts. qrs. lbs.		tons. cwts. qrs. lbs.		tons. cwts. qrs. lbs.		tons. cwts. qrs. lbs.		tons. cwts. qrs. lbs.		tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.
	Grass: Quantities weighed - - -				0 4 3 8½		0 3 3 21½		0 4 0 5½		0 4 0 6		0 5 1 18½		0 3 3 18½		0 3 3 2½		1 9 3 25	0 1 1 20
	Oilcake (equal parts linseed and rape cake) -				0 0 0 9		0 0 0 9		0 0 0 9		0 0 0 9		0 0 0 9		0 0 0 9		0 0 0 9		0 0 2 7	0 0 0 3
Yield of Milk, &c.					lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.
1	Cross Sht.-horn	6	Mar. 20	1,042	16 5	11 11	16 1	11 8	15 8	11 4	15 7	11 6	15 4	12 2	16 0	11 2	15 15	10 6	189 15	27 2
2	Cross Sht.-horn	7	Dec. 25	1,054	10 2	11 7	10 8	12 13	11 0	10 6	9 10	11 8	10 4	11 0	10 1	9 4	10 11	11 13	150 7	21 8
3	Cross Sht.-horn	Aged	Feb. 26	948	16 0	12 1	15 8	12 0	16 0	11 15	15 9	11 8	17 6	11 1	16 8	12 3	16 2	11 7	195 4	27 14
			Totals -	3,044	42 7	35 3	42 1	36 5	42 8	33 9	40 10	34 6	42 14	34 3	42 9	32 9	42 12	33 10	535 10	—
			Means -	1,015	14 2	11 12	14 0	12 2	14 3	11 3	13 9	11 7	14 5	11 6	14 3	10 14	14 4	11 3	178 9	25 8

Twelve Cows.—Sewaged Grass.

Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (May 29). lbs.	Friday. A.M.	Friday. P.M.	Saturday. A.M.	Saturday. P.M.	Sunday. A.M.	Sunday. P.M.	Monday. A.M.	Monday. P.M.	Tuesday. A.M.	Tuesday. P.M.	Wednesday. A.M.	Wednesday. P.M.	Thursday. A.M.	Thursday. P.M.	Total in 7 days.	Per head per day.
Food consumed.	Grass: From which Field, Plot, and Crop.				—		Ten-acre, Plot 2, Crop 1.		Ten-acre, Plot 2, Crop 1.		Ten-acre, Plot 2, Crop 1.		Ten-acre, Plot 2, Crop 1.		Ten-acre, Plot 2, Crop 1.		Ten-acre, Plot 2, Crop 1.		—	—
					tons. cwts. qrs. lbs.		tons. cwts. qrs. lbs.		tons. cwts. qrs. lbs.		tons. cwts. qrs. lbs.		tons. cwts. qrs. lbs.		tons. cwts. qrs. lbs.		tons. cwts. qrs. lbs.		tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.
	Grass: Quantities weighed - - -				—		0 13 1 22		0 7 1 22		0 7 2 23		0 12 2 19		0 12 0 23		0 13 0 21		3 6 3 18	0 0 3 5
	Oilcake (equal parts linseed and rape cake) -				0 0 1 8		0 0 1 8		0 0 1 8		0 0 1 8		0 0 1 8		0 0 1 8		0 0 1 8		0 2 1 0	0 0 0 3
Yield of Milk, &c.					lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.
1	Cross Sht.-horn	6	Nov. 18	1,178	11 8	9 8	12 6	9 0	11 9	13	11 1	8 12	12 8	8 11	12 7	9 4	12 1	8 10	147 2	21 0
2	Cross Sht.-horn	8	Feb. 2	1,208	11 13	9 6	11 8	8 14	11 12	9 8	10 9	8 5	11 10	8 6	11 3	8 9	11 8	7 3	140 2	20 0
3	Cross Sht.-horn	6	Dec. 1	1,153	10 6	8 7	10 7	8 6	10 11	7 4	8 2	7 0	10 7	8 5	11 1	8 4	10 9	7 12	127 1	18 2
4	Cross Sht.-horn	Aged	Jan. 26	972	11 8	8 8	10 13	8 0	12 0	8 4	8 7	8 7	10 14	7 13	11 8	7 13	11 0	8 2	133 1	19 0
5	Cross Sht.-horn	6	Nov. 17	1,107	9 2	8 9	10 0	7 12	9 6	8 3	7 3	7 6	9 15	7 0	9 4	6 8	8 11	6 9	115 8	16 8
6	Cross Sht.-horn	Aged	Jan. 13	1,096	12 10	9 15	13 2	9 4	13 2	9 8	12 2	8 12	13 3	9 1	12 12	10 2	12 6	8 13	154 12	22 2
7	Cross Sht.-horn	6	May 2	1,068	19 8	16 0	19 2	14 14	19 10	14 11	18 0	14 5	22 1	14 1	19 10	14 0	19 12	14 1	239 11	34 4
8	Cross Ayrshire	3	Apr. 13	785	10 0	8 1	10 4	6 15	10 0	8 0	9 7	6 14	10 6	6 13	10 7	7 4	10 11	7 9	122 11	17 8
9	Cross Sht.-horn	Aged	Feb. 16	1,018	11 8	10 11	13 6	9 1	13 5	9 12	12 6	10 3	13 2	9 13	13 8	10 0	13 2	8 13	158 10	22 11
10	Ayrshire -	6	Apr. 3	950	17 4	13 5	17 15	12 11	18 2	12 8	16 12	12 9	17 7	12 8	16 13	12 12	17 9	12 3	210 6	30 1
11	Guernsey -	4	Mar. 30	835	12 6	9 9	13 7	8 4	12 10	8 15	12 8	8 10	11 13	10 7	11 11	10 1	12 11	9 11	152 11	21 13
12	Cross Sht.-horn	7	Nov. 16	1,090	12 9	10 0	14 7	8 12	12 12	9 11	12 2	9 7	13 5	9 2	12 4	9 4	12 13	8 8	155 0	22 2
			Totals -	12,460	150 2	121 15	156 13	111 13	154 15	116 1	138 11	110 19	156 11	112 0	152 8	113 13	152 13	107 14	1,856 11	—
			Means -	1,038	12 8	10 3	13 1	9 5	12 15	9 11	11 9	9 3	13 1	9 5	12 11	9 8	12 12	9 0	154 12	22 2

Table IX.—*continued.*

Detailed Record of Food consumed, and Milk yielded, by Cows fed on the Unsewaged and Sewaged Meadow Grass, with Oilcake in addition.

Second Season, 1862 ; 7 days.—June 20 to June 26.

THREE COWS.—UNSEWAGED GRASS.

Food consumed.		Friday.	Saturday.	Sunday.	Monday.	Tuesday.	Wednesday.	Thursday.	Total in 7 days.	Per head per day.
Grass	From which Field, Plot and Crop.	Ten-acre, Plot 1, Crop 1.	Ten-acre, Plot 1, Crop 1.	Ten-acre, Plot 1, Crop 1.	Ten-acre, Plot 1, Crop 1.	Ten-acre, Plot 1, Crop 1.	Ten-acre, Plot 1, Crop 1.	Ten-acre, Plot 1, Crop 1.	—	—
		tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.
	Quantities weighed - - -	0 3 1 11½	0 4 0 2½	0 4 2 8½	0 4 2 9	0 4 0 8½	0 3 0 14½	0 3 1 22½	1 7 0 21	0 1 1 5
Oilcake (equal parts linseed and rape cake) -		0 0 0 9	0 0 0 9	0 0 0 9	0 0 0 9	0 0 0 9	0 0 0 9	0 0 0 9	0 0 2 7	0 0 0 3

Yield of Milk, &c. Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (June 26). lbs.	Friday A.M. lbs. ozs.	Friday P.M. lbs. ozs.	Saturday A.M. lbs. ozs.	Saturday P.M. lbs. ozs.	Sunday A.M. lbs. ozs.	Sunday P.M. lbs. ozs.	Monday A.M. lbs. ozs.	Monday P.M. lbs. ozs.	Tuesday A.M. lbs. ozs.	Tuesday P.M. lbs. ozs.	Wednesday A.M. lbs. ozs.	Wednesday P.M. lbs. ozs.	Thursday A.M. lbs. ozs.	Thursday P.M. lbs. ozs.	Total in 7 days. lbs. ozs.	Per head per day. lbs. ozs.
1	Cross Sht.-horn	6	Mar. 20	1,092	15 6	10 8	14 8	11 1	15 12	11 2	15 9	11 0	14 4	10 12	15 4	10 9	14 12	10 8	180 15	25 14
2	Cross Sht.-horn	7	Dec. 25	1,093	10 8	10 4	11 8	9 0	11 13	10 6	10 4	10 6	10 14	10 3	10 4	10 11	9 11	12 11	148 7	21 3
3	Cross Sht.-horn	Aged	Feb. 26	976	16 14	11 10	15 12	12 5	16 4	12 1	15 0	11 13	15 12	12 0	15 13	12 8	15 9	11 9	194 14	27 13
			Totals -	3,161	42 12	32 6	41 12	32 6	43 13	33 9	40 13	33 3	40 14	32 15	41 5	33 12	40 0	34 12	524 4	—
			Means -	1,054	14 4	10 13	13 14	10 13	14 10	11 3	13 10	11 1	13 10	11 0	13 12	11 4	13 5	11 9	174 12	24 15

TWELVE COWS.—SEWAGED GRASS.

Food consumed.		Friday.	Saturday.	Sunday.	Monday.	Tuesday.	Wednesday.	Thursday.	Total in 7 days.	Per head per day.
Grass	From which Field, Plot, and Crop.	Ten-acre, Plot 2, Crop 1.	Ten-acre, Plot 2, Crop 1.	Ten-acre, Plot 2, Crop 1.	Ten-acre, Plot 2, Crop 1.	Ten-acre, Plot 2, Crop 1.	Ten-acre, Plot 2, Crop 1.	Ten-acre, Plot 2, Crop 1.	—	—
		tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.
	Quantities weighed - - -	0 14 0 19	0 12 1 5	0 11 3 13	0 11 3 18	0 11 3 23	0 12 1 2	0 11 0 24	4 5 2 20	0 1 0 2
Oilcake (equal parts linseed and rape cake) -		0 0 1 8	0 0 1 8	0 0 1 8	0 0 1 8	0 0 1 8	0 0 1 8	0 0 1 8	0 2 1 0	0 0 0 3

Yield of Milk, &c. Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (June 26). lbs.	Friday A.M. lbs. ozs.	Friday P.M. lbs. ozs.	Saturday A.M. lbs. ozs.	Saturday P.M. lbs. ozs.	Sunday A.M. lbs. ozs.	Sunday P.M. lbs. ozs.	Monday A.M. lbs. ozs.	Monday P.M. lbs. ozs.	Tuesday A.M. lbs. ozs.	Tuesday P.M. lbs. ozs.	Wednesday A.M. lbs. ozs.	Wednesday P.M. lbs. ozs.	Thursday A.M. lbs. ozs.	Thursday P.M. lbs. ozs.	Total in 7 days. lbs. ozs.	Per head per day. lbs. ozs.
1	Cross Sht.-horn	6	Nov. 18	1,246	12 0	8 5	12 1	8 9	12 0	9 5	11 14	8 12	11 8	9 2	11 6	8 15	11 7	8 12	144 0	20 9
2	Cross Sht.-horn	8	Feb. 2	1,262	11 1	7 7	11 0	7 14	10 13	7 14	10 11	7 9	10 0	8 0	10 12	7 1	10 9	7 4	127 15	18 4
3	Cross Sht.-horn	6	Dec. 1	1,194	10 14	7 12	9 11	7 12	10 11	8 4	10 12	7 9	10 1	8 1	10 9	8 2	10 11	8 3	129 0	18 7
4	Cross Sht.-horn	Aged	Jan. 26	994	10 11	7 9	10 14	7 13	11 6	7 15	11 3	8 1	11 8	8 0	11 6	7 10	11 2	7 12	132 14	19 0
5	Cross Sht.-horn	6	Nov. 17	1,158	8 6	6 0	8 2	6 0	7 12	5 10	7 9	5 11	7 6	6 0	7 10	5 2	7 0	5 7	93 11	13 6
6	Cross Sht.-horn	Aged	Jan. 13	1,126	12 1	8 5	12 3	8 11	12 4	9 0	12 6	8 13	12 8	9 5	12 4	9 9	12 3	9 0	148 8	21 4
7	Cross Sht.-horn	6	May 2	1,084	19 11	13 2	18 9	13 6	19 11	13 12	18 11	13 4	19 8	13 13	17 0	15 9	18 4	14 1	228 5	32 10
8	Cross Ayrshire	3	Apr. 13	797	10 8	6 14	10 0	7 0	10 8	7 4	10 6	7 12	10 12	7 2	10 4	7 4	9 8	7 2	122 4	17 7
9	Cross Sht.-horn	Aged	Feb. 16	1,088	13 1	8 13	11 12	10 4	11 12	10 10	12 5	9 4	13 0	9 4	13 1	8 12	13 1	9 0	153 15	22 0
10	Ayrshire -	6	Apr. 30	953	17 2	11 5	16 14	11 6	16 8	12 4	16 8	12 2	16 9	11 4	16 12	10 14	15 13	10 12	196 1	28 0
11	Guernsey -	4	Mar. 30	850	11 11	8 14	12 0	9 8	12 6	9 0	11 12	8 8	10 11	8 3	11 15	8 13	11 9	8 7	143 5	20 8
12	Cross Sht.-horn	7	Nov. 16	1,142	13 4	8 7	12 11	9 9	12 4	9 4	11 14	8 12	12 6	8 13	12 1	8 12	11 10	7 12	147 7	21 1
			Totals -	12,894	150 6	102 13	145 13	107 12	147 15	110 2	145 15	106 1	145 13	106 15	145 0	106 7	142 13	103 8	1,767 5	—

Second Season, 1862; 7 days.—June 27 to July 3.

THREE COWS.—UNSEWAGED GRASS.

Food consumed.	Friday.	Saturday.	Sunday.	Monday.	Tuesday.	Wednesday.	Thursday.	Total in 7 days.	Per head per day.
Grass: From which Field, Plot, and Crop.	Ten-acre, Plot 1, Crop 1.	Ten-acre, Plot 1, Crop 1.	Ten-acre, Plot 1, Crop 1.	Ten-acre, Plot 1, Crop 1.	—	Ten-acre, Plot 1, Crop 1.	—	—	—
	tons. cwts. qrs. lbs.	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*
Grass: Quantities weighed	0 3 3 23½	0 3 1 6½	0 4 0 20½	0 3 3 24	—	0 4 0 9½	—	0 19 2 0	0 0 3 20
Oilcake (rape-cake)	0 0 0 10½	0 0 0 10½	0 0 0 10½	0 0 0 10½	0 0 0 10½	0 0 0 10½	0 0 0 10½	0 0 2 17½	0 0 0 3½

Yield of Milk, &c.

Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (June 26). *lbs.*	Friday A.M. *lbs. ozs.*	Friday P.M. *lbs. ozs.*	Saturday A.M. *lbs. ozs.*	Saturday P.M. *lbs. ozs.*	Sunday A.M. *lbs. ozs.*	Sunday P.M. *lbs. ozs.*	Monday A.M. *lbs. ozs.*	Monday P.M. *lbs. ozs.*	Tuesday A.M. *lbs. ozs.*	Tuesday P.M. *lbs. ozs.*	Wednesday A.M. *lbs. ozs.*	Wednesday P.M. *lbs. ozs.*	Thursday A.M. *lbs. ozs.*	Thursday P.M. *lbs. ozs.*	Total in 7 days. *lbs. ozs.*	Per head per day. *lbs. ozs.*
1	Cross Sht.-horn	6	Mar. 20	1,092	16 13	11 1	14 4	10 0	16 6	10 3	14 1	8 15	14 1	9 15	14 3	11 5	14 15	11 11	177 13	25 6
2	Cross Sht.-horn	7	Dec. 25	1,093	8 0	10 7	8 12	11 15	9 8	11 1	7 3	10 11	8 6	10 7	11 0	10 6	8 12	10 15	137 7	19 10
3	Cross Sht.-horn	Aged	Feb. 26	976	15 4	11 0	14 6	12 1	16 14	12 2	15 0	10 4	14 5	12 0	16 0	10 11	16 4	12 1	188 4	26 14
			Totals -	3,161	40 1	32 8	37 6	34 0	42 12	33 6	36 4	29 14	36 12	32 6	41 3	32 6	39 15	34 11	503 8	—
			Means -	1,054	13 6	10 13	12 7	11 5	14 4	11 2	12 1	9 15	12 4	10 13	13 12	10 13	13 5	11 9	167 13	24 0

TWELVE COWS.—SEWAGED GRASS.

Food consumed.	Friday.	Saturday.	Sunday.	Monday.	Tuesday.	Wednesday.	Thursday.	Total in 7 days.	Per head per day.
Grass: From which Field, Plot, and Crop.	Ten-acre, Plot 2, Crop 1.	Ten-acre, Plot 2, Crop 1.	Ten-acre, Plot 4, Crop 2.	Ten-acre, Plot 00*, Crop 1.	Ten-acre, Plot 4, Crop 2.	Ten-acre, Plot 4, Crop 2.	Ten-acre, Plot 4, Crop 2.	—	—
	tons. cwts. qrs. lbs.	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*
Grass: Quantities weighed	0 12 3 2	0 11 3 2	0 17 2 13	0 13 0 7	0 16 3 11	0 12 1 20	0 17 2 9	5 2 0 8	0 1 0 24
Oilcake (rape-cake)	0 0 1 14	0 0 1 14	0 0 1 14	0 0 1 14	0 0 1 14	0 0 1 14	0 0 1 14	0 2 2 14	0 0 0 3½

Yield of Milk, &c.

Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (June 25). *lbs.*	Friday A.M. *lbs. ozs.*	Friday P.M. *lbs. ozs.*	Saturday A.M. *lbs. ozs.*	Saturday P.M. *lbs. ozs.*	Sunday A.M. *lbs. ozs.*	Sunday P.M. *lbs. ozs.*	Monday A.M. *lbs. ozs.*	Monday P.M. *lbs. ozs.*	Tuesday A.M. *lbs. ozs.*	Tuesday P.M. *lbs. ozs.*	Wednesday A.M. *lbs. ozs.*	Wednesday P.M. *lbs. ozs.*	Thursday A.M. *lbs. ozs.*	Thursday P.M. *lbs. ozs.*	Total in 7 days. *lbs. ozs.*	Per head per day. *lbs. ozs.*
1	Cross Sht.-horn	6	Nov. 18	1,246	11 8	8 4	11 0	8 9	11 0	10 2	10 6	7 10	10 11	8 9	11 10	8 10	11 12	8 9	138 4	19 12
2	Cross Sht.-horn	8	Feb. 2	1,262	9 10	7 0	9 4	7 1	9 10	8 0	8 4	6 11	8 10	7 8	9 8	7 2	9 11	7 6	115 5	16 8
3	Cross Sht.-horn	6	Dec. 1	1,194	10 11	8 0	10 6	8 0	11 6	8 4	9 7	7 6	10 0	8 6	11 9	7 9	11 4	8 0	130 4	18 10
4	Cross Sht.-horn	Aged	Jan. 23	994	10 6	7 6	10 6	8 0	10 12	7 15	10 8	7 3	10 6	8 3	11 4	7 11	11 6	7 14	129 4	18 7
5	Cross Sht.-horn	6	Nov. 17	1,158	7 4	5 4	7 3	6 6	7 12	7 6	7 6	5 13	7 10	6 14	8 12	6 6	9 0	6 12	99 12	14 4
6	Cross Sht.-horn	Aged	Jan. 13	1,126	12 5	8 9	12 0	9 1	12 2	10 5	12 0	7 12	12 0	9 6	12 9	8 10	12 11	9 4	148 10	21 4
7	Cross Sht.-horn	6	May 2	1,084	18 1	12 8	17 2	13 1	19 3	13 12	18 4	12 14	19 0	13 15	19 10	13 10	20 2	14 0	225 2	32 3
8	Cross Ayrshire	3	Apr. 13	797	9 4	7 9	9 11	9 9	10 2	7 14	9 12	6 10	10 4	7 11	11 4	7 6	11 8	7 13	126 5	18 1
9	Cross Sht.-horn	Aged	Feb. 16	1,088	12 12	9 10	12 4	11 1	13 2	9 6	10 12	8 4	12 14	9 15	13 9	9 5	14 0	8 13	155 11	22 4
10	Ayrshire -	6	Apr. 3	953	15 14	11 12	16 12	8 3	17 12	12 13	15 4	10 13	16 0	12 9	18 0	11 6	18 8	12 0	197 10	28 4
11	Guernsey -	4	Mar. 30	850	12 1	8 6	12 0	8 4	12 10	9 7	10 4	7 14	11 2	11 2	12 3	9 5	12 15	8 7	146 0	20 14
12	Cross Sht.-horn	7	Nov. 16	1,142	11 8	8 1	11 4	8 6	12 6	9 4	11 8	7 2	11 4	9 9	12 6	8 14	12 0	7 12	141 4	20 3
			Totals -	12,894	141 4	102 5	139 4	105 9	147 13	114 8	133 11	96 0	139 13	113 11	152 4	105 14	154 13	106 10	1,753 7	—
			Means -	1,075	11 12	8 8	11 10	8 13	12 5	9 9	11 2	8 0	11 11	9 8	12 11	8 13	12 14	8 14	146 2	20 14

* Unmeasured land; designated Plot 0 when unsewaged and Plot 00 when sewaged.

Table IX.—*continued.*

Detailed Record of Food consumed, and Milk yielded, by Cows fed on the Unsewaged and Sewaged Meadow Grass, with Oilcake in addition.

Second Season, 1862; 7 days.—July 4 to July 10.

THREE COWS.—UNSEWAGED GRASS.

Food consumed.					Friday.		Saturday.		Sunday.		Monday.		Tuesday.		Wednesday.		Thursday.		Total in 7 days.	Per head per day.
Grass: From which Field, Plot, and Crop.					Ten-acre, Plot 1, Crop 1.		Ten-acre, Plot 1, Crop 1.		Ten-acre, Plot 1, Crop 1.		Ten-acre, Plot 1, Crop 1.		Ten-acre, Plot 1, Crop 1.		Ten-acre, Plot 1, Crop 1.		Ten-acre, Plot 1, Crop 1.		—	—
					tons. cwts. qrs. lbs.		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*
Grass: Quantities weighed					0 2 0 21½		0 2 2 10½		0 3 1 8½		0 3 1 9		0 3 0 16½		0 4 2 23½		0 4 0 6½		1 3 1 12	0 1 0 13
Oilcake (rape-cake)					0 0 0 10½		0 0 0 10½		0 0 0 10½		0 0 0 10½		0 0 0 10½		0 0 0 10½		0 0 0 10½		0 0 2 17½	0 0 0 3½
Yield of Milk, &c. Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (July 10). *lbs.*	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	—	—
					lbs. ozs.	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*
1	Cross Sht.-horn	6	Mar. 20	1,037	16 0	10 13	14 8	9 0	14 13	10 0	16 14	9 8	12 5	9 3	14 6	11 10	14 10	10 5	173 15	24 14
2	Cross Sht.-horn	7	Dec. 25	1,100	9 3	10 13	9 10	9 1	9 12	9 6	7 7	10 8	7 1	11 5	10 2	10 5	9 8	8 2	132 3	18 14
3	Cross Sht.-horn	Aged	Feb. 26	988	16 3	11 9	16 6	10 11	15 14	11 12	15 0	9 12	14 8	9 12	16 1	11 0	16 14	11 6	186 12	26 11
			Totals -	3,175	41 6	33 3	40 8	28 12	40 7	31 2	39 5	29 12	33 14	30 4	40 9	32 15	41 0	29 13	492 14	—
			Means -	1,058	13 13	11 1	13 8	9 9	13 8	10 6	13 2	9 15	11 5	10 1	13 8	11 0	13 10	9 15	164 5	23 8

TWELVE COWS.—SEWAGED GRASS.

Food consumed.					Friday.		Saturday.		Sunday.		Monday.		Tuesday.		Wednesday.		Thursday.		Total in 7 days.	Per head per day.
Grass: From which Field, Plot, and Crop.					Ten-acre, Plot 4, Crop 2.		Ten-acre, Plot 4, Crop 2.		Ten-acre, Plot 4, Crop 2.		Ten-acre, Plot 4, Crop 2.		Ten-acre, Plot 4, Crop 2.		Ten-acre, Plot 4, Crop 2.		Ten-acre, Plot 4, Crop 2.		—	—
					tons. cwts. qrs. lbs.		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*
Grass: Quantities weighed					0 14 3 25		0 7 0 23		0 15 0 17		0 15 0 25		0 16 1 6		0 16 1 11		0 17 2 19		5 2 3 14	0 1 0 25
Oilcake (rape-cake)					0 0 1 14		0 0 1 14		0 0 1 14		0 0 1 14		0 0 1 14		0 0 1 14		0 0 1 14		0 2 2 14	0 0 0 3½
Yield of Milk, &c. Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (July 10). *lbs.*	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	—	—
					lbs. ozs.	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*
1	Cross Sht.-horn	6	Nov. 18	1,190	11 13	8 10	11 6	8 10	12 0	10 0	11 2	8 12	11 13	8 5	11 2	9 5	11 15	8 6	143 3	20 7
2	Cross Sht.-horn	8	Feb. 2	1,263	9 0	7 12	9 12	7 0	9 4	7 6	9 12	7 0	9 0	7 0	9 12	7 3	9 10	7 5	116 12	16 11
3	Cross Sht.-horn	6	Dec. 1	1,204	11 0	8 5	10 11	8 2	11 2	9 3	10 13	8 4	11 0	8 5	11 6	8 8	11 9	8 7	136 11	19 8
4	Cross Sht.-horn	Aged	Jan. 26	983	11 10	8 4	11 6	7 10	11 6	8 9	10 10	8 2	11 2	8 9	12 4	8 11	12 3	8 9	138 15	19 14
5	Cross Sht.-horn	6	Nov. 17	1,132	8 6	7 2	9 2	7 2	9 4	7 13	8 6	7 0	8 4	6 13	9 3	6 12	8 6	6 14	110 7	15 12
6	Cross Sht.-horn	Aged	Jan. 13	1,118	12 2	9 0	12 10	9 11	12 13	9 8	12 4	8 4	12 3	8 13	12 10	9 12	12 10	9 2	151 6	21 10
7	Cross Sht.-horn	6	May 2	1,099	19 8	13 15	19 4	14 8	19 7	15 2	18 8	13 0	18 15	14 0	18 14	14 4	19 0	14 8	232 13	33 4
8	Cross Ayrshire	3	Apr. 13	822	11 9	7 11	11 0	8 4	11 12	8 0	11 0	7 3	10 14	7 12	11 10	8 0	11 14	7 13	134 6	19 3
9	Cross Sht.-horn	Aged	Feb. 16	1,082	13 0	9 9	12 13	9 10	12 11	10 8	13 0	8 9	12 8	9 4	12 11	9 15	12 14	9 4	158 4	22 5
10	Ayrshire -	6	Apr. 3	918	18 2	11 14	18 2	12 3	18 0	13 1	16 4	11 0	16 12	11 12	17 6	12 10	17 8	11 15	206 9	29 8
11	Guernsey -	4	Mar. 30	828	11 12	8 15	12 10	9 7	12 2	9 10	11 4	8 4	12 1	9 7	12 4	9 11	12 1	9 12	149 4	21 5
12	Cross Sht.-horn	7	Nov. 16	1,116	12 14	8 13	13 0	8 14	13 1	8 1	12 6	8 2	11 13	9 0	14 5	9 2	13 6	9 1	151 14	21 11
					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	116 13	145 5	103 8	146 5	109 0	153 7	113 13	153 0	111 0	1,828 8	—

Detailed Record of Food consumed, and Milk yielded, by Cows fed on the Unsewaged and Sewaged Meadow Grass, with Oilcake in addition.

Second Season, 1862; 7 days.—July 11 to July 17.

THREE COWS.—UNSEWAGED GRASS.

					Friday. A.M.	Friday. P.M.	Saturday. A.M.	Saturday. P.M.	Sunday. A.M.	Sunday. P.M.	Monday. A.M.	Monday. P.M.	Tuesday. A.M.	Tuesday. P.M.	Wednesday. A.M.	Wednesday. P.M.	Thursday. A.M.	Thursday. P.M.	Total in 7 days.	Per head per day.
Food consumed. Grass: From which Field, Plot, and Crop.					—		Ten-acre, Plot 1, Crop 1.		Ten-acre, Plot 1, Crop 1.		Ten-acre, Plot 1, Crop 1.		Ten-acre, Plot 1, Crop 1.		Ten-acre, Plot 0*, Crop 1.		Ten-acre, Plot 0*, Crop 1.		—	—
(tons. cwts. qrs. lbs.)																				
Grass: Quantities weighed - - -					..		0 2 1 24½		0 2 2 12½		0 2 2 9		0 2 1 25		0 2 0 25½		0 2 1 21½		0 14 3 6	0 0 2 23
Oilcake (1 part linseed and 3½ parts rape cake)					0 0 0 13⅓		0 0 0 13⅓		0 0 0 13⅓		0 0 0 13⅓		0 0 0 13⅓		0 0 0 13⅓		0 0 0 13⅓		0 0 3 10⅓	0 0 0 4½
Yield of Milk, &c. Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (July 10). lbs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.
1	Cross Sht.-horn	6	Mar. 20	1,087	14 10	9 4	13 2	9 12	13 7	10 9	15 0	10 5	14 10	10 1	14 12	10 0	13 11	9 4	168 7	24 1
2	Cross Sht.-horn	7	Dec. 25	1,100	9 2	9 15	9 7	9 15	8 12	10 1	11 0	7 13	9 0	10 12	8 7	9 1	8 8	9 0	130 13	18 11
3	Cross Sht.-horn	Aged	Feb. 26	988	13 8	12 6	13 6	10 8	15 1	11 5	16 2	11 2	14 5	11 0	15 4	11 0	15 0	10 2	180 1	25 12
			Totals -	3,175	37 4	31 9	35 15	30 3	37 4	31 15	42 2	29 4	37 15	31 13	38 7	30 1	37 3	28 6	479 5	—
			Means -	1,058	12 7	10 8	12 0	10 1	12 7	10 10	14 1	9 12	12 10	10 10	12 13	10 0	12 6	9 7	159 12	22 13

TWELVE COWS.—SEWAGED GRASS.

					Friday. A.M.	Friday. P.M.	Saturday. A.M.	Saturday. P.M.	Sunday. A.M.	Sunday. P.M.	Monday. A.M.	Monday. P.M.	Tuesday. A.M.	Tuesday. P.M.	Wednesday. A.M.	Wednesday. P.M.	Thursday. A.M.	Thursday. P.M.	Total in 7 days.	Per head per day.
Food consumed. Grass: From which Field, Plot, and Crop.					Ten-acre, Plot 4, Crop 2.		Ten-acre, Plot 4, Crop 2.		Ten-acre, Plot 4, Crop 2.		Ten-acre, Plot 3, Crop 2.		Ten-acre, Plot 3, Crop 2.		Ten-acre, Plot 3, Crop 2.		Ten-acre, Plot 3, Crop 2.		—	—
(tons. cwts. qrs. lbs.)																				
Grass: Quantities weighed - - - -					0 15 2 12		0 15 2 21		0 6 3 9		1 6 2 11		0 11 3 23		0 14 1 3		0 17 3 7		5 8 3 2	0 1 1 5
Oilcake (1 part linseed and 3½ parts rape cake)					0 0 1 26		0 0 1 26		0 0 1 26		0 0 1 26		0 0 1 26		0 0 1 26		0 0 1 26		0 3 1 14	0 0 0 4½
Yield of Milk, &c. Cows. Nos.	Breed	Years old.	Dates of Calving.	Weights (July 10). lbs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.
1	Cross Sht.-horn	6	Nov. 18	1,190	11 12	8 4	11 10	8 10	11 12	6 13	13 1	7 10	12 2	8 12	11 6	9 4	12 3	9 0	142 3	20 5
2	Cross Sht.-horn	8	Feb. 2	1,263	10 7	7 2	9 3	7 8	9 8	6 13	9 5	6 12	10 0	7 1	8 10	7 2	9 6	6 10	115 7	16 8
3	Cross Sht.-horn	6	Dec. 1	1,204	10 11	8 0	10 8	8 7	11 6	8 12	11 2	8 11	10 8	8 9	11 3	9 0	11 0	8 14	136 11	19 8
4	Cross Sht.-horn	Aged	Jan. 26	983	11 6	7 6	11 3	8 0	11 12	8 12	11 8	8 7	11 3	8 12	11 12	8 4	11 0	8 0	137 5	19 10
5	Cross Sht.-horn	6	Nov. 17	1,132	8 12	6 3	7 11	7 7	8 2	6 13	8 6	7 7	7 6	7 4	9 6	6 14	8 4	6 12	106 11	15 4
6	Cross Sht.-horn	Aged	Jan. 13	1,118	12 14	8 1	12 4	9 3	12 10	6 6	13 10	8 6	11 0	9 6	12 13	9 2	12 7	9 4	147 6	21 1
7	Cross Sht.-horn	6	May 2	1,099	20 0	11 9	19 2	12 4	19 0	13 13	19 6	14 8	17 10	14 0	19 6	13 13	19 1	11 4	224 12	32 2
8	Cross Ayrshire	3	Apl. 13	822	12 5	7 1	11 8	7 15	11 8	8 3	11 7	8 1	10 9	8 6	11 6	7 13	11 12	7 14	135 12	19 6
9	Cross Sht.-horn	Aged	Feb. 16	1,082	12 15	8 10	12 6	10 12	12 2	9 1	12 2	8 9	11 10	9 10	13 2	9 0	12 8	8 12	151 3	21 10
10	Ayrshire -	6	Apl. 3	918	17 11	10 10	16 7	12 0	17 9	12 4	17 12	10 12	15 6	12 10	18 6	12 13	18 2	12 11	205 1	29 5
11	Guernsey -	4	Mar. 30	828	13 0	8 5	12 9	9 0	12 15	9 15	12 8	9 14	11 8	9 6	12 0	9 10	12 15	9 10	153 3	21 14
12	Cross Sht.-horn	7	Nov. 16	1,116	13 1	7 12	11 6	8 7	12 6	8 13	11 5	8 10	11 7	8 12	12 8	8 14	12 13	8 12	144 14	20 11
			Totals -	12,755	154 14	98 15	145 13	109 9	150 10	106 6	151 8	107 11	140 5	112 8	151 14	111 9	151 7	107 7	1,800 8	—
			Means -	1,063	12 15	8 4	12 2	9 2	12 9	8 14	12 10	9 0	11 11	9 6	12 10	9 5	12 10	8 15	150 1	21 7

* Unmeasured land designated Plot 0 when unsewaged.

Table IX.—*continued.*

Detailed Record of Food consumed, and Milk yielded, by Cows fed on the Unsewaged and Sewaged Meadow Grass, with Oilcake in addition.

Second Season, 1862 ; 7 days.—July 18 to July 24.

THREE COWS.—UNSEWAGED GRASS.

Food consumed.	Friday.	Saturday.	Sunday.	Monday.	Tuesday.	Wednesday.	Thursday.	Total in 7 days.	Per head per day.
Grass: From which Field, Plot, and Crop.	Ten-acre, Plot 0,* Crop 1.	—	Ten-acre, Plot 0,* Crop 1.	Ten-acre, Plot 0,* Crop 1.	Ten-acre, Plot 0,* Crop 1.	†	Ten-acre, Plot 0,* Crop 1.	—	—
	tons. cwts. qrs. lbs.	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*
Grass: Quantities weighed - - -	0 3 0 18½	..	0 1 1 13	0 1 1 14	0 2 2 2	0 1 3 15	0 3 2 16	0 13 3 22½	0 0 2 18
Oilcake (1 part linseed and 3½ parts rape cake)	0 0 0 13½	0 0 0 13½	0 0 0 13½	0 0 0 13½	0 0 0 13½	0 0 0 13½	0 0 0 13½	0 0 3 10½	0 0 0 4½

Yield of Milk, &c. (*lbs. ozs.*)

Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (July 24). *lbs.*	Fri. A.M.	Fri. P.M.	Sat. A.M.	Sat. P.M.	Sun. A.M.	Sun. P.M.	Mon. A.M.	Mon. P.M.	Tues. A.M.	Tues. P.M.	Wed. A.M.	Wed. P.M.	Thurs. A.M.	Thurs. P.M.	Total in 7 days.	Per head per day.
1	Cross Sht.-horn	6	Mar. 20	1,090	14 0	9 0	14 0	9 14	14 10	9 13	13 3	9 2	13 2	8 14	14 2	10 0	14 8	9 11	163 15	23 7
2	Cross Sht.-horn	7	Dec. 25	1,127	9 1	9 8	8 0	7 12	8 2	9 0	5 3	10 12	6 5	9 9	8 6	9 10	8 14	8 8	118 10	16 15
3	Cross Sht.-horn	Aged	Feb. 26	1,011	14 12	10 9	15 6	10 12	14 10	11 0	15 0	10 4	14 15	10 11	15 2	11 10	15 12	11 15	182 6	26 1
			Totals -	3,228	37 13	29 1	37 6	28 6	37 6	29 13	33 6	30 2	34 6	29 2	37 10	31 4	39 2	30 2	464 15	—
			Means -	1,076	12 10	9 11	12 7	9 7	12 7	9 15	11 2	10 1	11 7	9 11	12 9	10 7	13 1	10 1	155 0	22 2

TWELVE COWS.—SEWAGED GRASS.

Food consumed.	Friday.	Saturday.	Sunday.	Monday.	Tuesday.	Wednesday.	Thursday.	Total in 7 days.	Per head per day.
Grass: From which Field, Plot, and Crop.	Ten-acre, Plot 3, Crop 2.	Ten-acre, Plot 3, Crop 2.	Ten-acre, Plots 2 and 3, Crop 2.	Ten-acre, Plots 2 and 3, Crop 2.	†	†	†	—	—
	tons. cwts. qrs. lbs.	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*
Grass: Quantities weighed - - -	0 13 1 27	0 15 3 12	0 13 3 27	0 13 3 27	0 7 3 22	0 10 0 9	0 18 2 14	4 13 3 26	0 1 0 13
Oilcake (1 part linseed and 3½ parts rape cake)	0 0 1 26	0 0 1 26	0 0 1 26	0 0 1 26	0 0 1 26	0 0 1 26	0 0 1 26	0 3 1 14	0 0 0 4½

Yield of Milk, &c. (*lbs. ozs.*)

Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (July 24). *lbs.*	Fri. A.M.	Fri. P.M.	Sat. A.M.	Sat. P.M.	Sun. A.M.	Sun. P.M.	Mon. A.M.	Mon. P.M.	Tues. A.M.	Tues. P.M.	Wed. A.M.	Wed. P.M.	Thurs. A.M.	Thurs. P.M.	Total in 7 days.	Per head per day.
1	Cross Sht.-horn	6	Nov. 18	1,192	11 12	9 2	12 1	8 10	11 14	9 6	11 2	9 0	11 8	9 2	11 12	8 12	12 0	8 4	144 5	20 10
2	Cross Sht.-horn	8	Feb. 2	1,246	9 2	6 4	7 12	6 0	7 13	6 14	8 12	6 4	8 14	7 0	8 14	6 10	8 11	7 1	105 15	15 2
3	Cross Sht.-horn	6	Dec. 1	1,232	10 13	8 5	11 10	8 4	11 9	8 14	11 0	8 1	10 13	8 3	11 3	7 8	11 0	8 9	135 12	19 6
4	Cross Sht.-horn	Aged	Jan. 26	1,000	10 12	8 9	10 14	7 12	10 12	6 15	10 3	7 10	10 10	8 2	11 1	8 1	11 6	7 10	130 5	18 10
5	Cross Sht.-horn	6	Nov. 17	1,176	7 14	7 3	8 10	5 12	8 5	6 6	7 8	7 2	8 4	6 10	8 12	7 0	8 12	6 7	104 9	14 15
6	Cross Sht.-horn	Aged	Jan. 13	1,121	12 4	8 5	12 7	8 15	12 15	9 8	12 4	9 1	12 12	9 5	12 2	9 6	12 2	9 8	150 14	21 9
7	Cross Sht.-horn	6	May 2	1,071	17 0	14 13	18 14	13 0	17 8	12 4	18 13	13 0	18 2	12 2	18 6	12 4	18 12	11 11	216 9	30 15
8	Cross Ayrshire	3	Apr. 13	824	11 4	7 15	12 0	7 13	10 7	7 3	10 14	7 1	10 0	6 4	9 10	6 10	10 14	7 9	125 8	17 15
9	Cross Sht.-horn	Aged	Feb. 16	1,116	12 8	9 6	12 2	9 13	12 6	9 12	12 10	9 11	12 10	9 5	12 11	9 1	12 15	9 7	154 5	22 1
10	Ayrshire -	6	Apr. 3	952	17 2	11 12	18 0	12 4	17 4	12 1	17 13	12 4	16 14	12 5	16 12	12 4	18 0	12 5	207 0	29 9
11	Guernsey -	4	Mar. 30	854	12 4	9 6	12 13	8 11	12 13	10 1	12 8	9 5	12 11	9 14	12 10	9 4	12 11	9 8	154 7	22 1
12	Cross Sht.-horn	7	Nov. 16	1,162	12 11	8 8	12 9	8 7	12 0	8 8	12 6	9 1	12 13	8 14	12 14	8 8	12 0	9 5	148 8	21 3
			Totals -	12,946	145 6	109 8	149 12	105 5	145 10	107 12	145 13	107 8	145 15	107 2	146 11	105 4	149 3	107 4	1,778 1	—
			Means -	1,079	12 2	9 2	12 8	8 12	12 2	9 0	12 2	8 15	12 3	8 15	12 4	8 12	12 7	8 15	148 3	21 2

... yielded, by Cows fed on the Unsewaged and Sewaged Meadow Grass, with Oilcake in addition.

Second Season, 1862; 7 days.—July 25 to July 31.

Three Cows.—Unsewaged Grass.

Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (July 24) lbs.	Friday A.M.	Friday P.M.	Saturday A.M.	Saturday P.M.	Sunday A.M.	Sunday P.M.	Monday A.M.	Monday P.M.	Tuesday A.M.	Tuesday P.M.	Wednesday A.M.	Wednesday P.M.	Thursday A.M.	Thursday P.M.	Total in 7 days.	Per head per day.
Food consumed. Grass — From which Field, Plot, and Crop.					Ten-acre, Plot 0,* Crop 2.		Ten-acre, Plot 0,* Crop 2.		Ten-acre, Plot 0,* Crop 2.		Ten-acre, Plot 0,* Crop 2		†		†		†		—	—
Grass — Quantities weighed (tons. cwts. qrs. lbs.)					0 4 3 16		0 3 3 24		0 3 1 23		0 3 1 23		0 5 2 6		0 4 2 10		0 4 0 21		1 10 0 11	0 1 1 21
Oilcake (rape-cake) (tons. cwts. qrs. lbs.)					0 0 0 12		0 0 0 12		0 0 0 12		0 0 0 12		0 0 0 12		0 0 0 12		0 0 0 12		0 0 3 0	0 0 0 4
Yield of Milk, &c. (lbs. ozs.)																			—	—
1	Cross Sht.-horn	6	Mar. 20	1,090	14 1	10 9	14 6	10 4	14 0	13 4	13 8	10 0	14 9	10 11	15 2	11 3	15 0	10 8	177 1	25 5
2	Cross Sht.-horn	7	Dec. 25	1,127	8 2	9 11	9 8	9 6	8 1	11 14	7 10	9 4	8 15	9 8	8 7	9 0	7 4	9 12	126 6	18 1
3	Cross Sht.-horn	Aged	Feb. 26	1,011	15 7	11 8	16 8	11 1	15 4	10 15	14 0	10 6	15 11	11 5	16 2	10 6	15 9	11 1	185 3	26 7
	Totals -			3,228	37 10	31 12	40 6	30 11	37 5	36 1	35 2	29 10	39 3	31 8	39 11	30 9	37 13	31 5	488 10	—
	Means -			1,076	12 9	10 9	13 7	10 4	12 7	12 0	11 11	9 14	13 1	10 8	13 4	10 3	12 10	10 7	162 14	23 4

Twelve Cows.—Sewaged Grass.

Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (July 24). lbs.	Friday A.M.	Friday P.M.	Saturday A.M.	Saturday P.M.	Sunday A.M.	Sunday P.M.	Monday A.M.	Monday P.M.	Tuesday A.M.	Tuesday P.M.	Wednesday A.M.	Wednesday P.M.	Thursday A.M.	Thursday P.M.	Total in 7 days.	Per head per day.
Food consumed. Grass — From which Field, Plot, and Crop.					Ten-acre, Plots 00* and 2, Crop 2.		Ten-acre, Plot 00*, Crop 2.		‡		‡		‡		‡		Five-acre, Plot 4, Crop 2.		—	—
Grass — Quantities weighed (tons. cwts. qrs. lbs.)					0 13 1 6		0 11 1 24		0 10 1 22		0 10 1 22		0 14 0 14		0 12 2 0		0 12 0 25		4 4 2 1	0 1 0 1
Oilcake (rape-cake) (tons. cwts. qrs. lbs.)					0 0 1 20		0 0 1 20		0 0 1 20		0 0 1 20		0 0 1 20		0 0 1 20		0 0 1 20		0 3 0 0	0 0 0 4
Yield of Milk, &c. (lbs. ozs.)																			—	—
1	Cross Sht.-horn	6	Nov. 18	1,192	11 8	8 8	11 12	9 0	11 10	9 7	10 12	8 9	11 11	9 6	11 12	9 0	11 8	8 7	142 14	20 7
2	Cross Sht.-horn	8	Feb. 2	1,246	9 4	6 7	9 2	6 8	8 12	6 2	9 2	6 0	8 10	7 0	9 11	6 8	8 10	6 4	108 0	15 7
3	Cross Sht.-horn	6	Dec. 1	1,232	10 11	7 7	11 0	7 14	11 2	8 0	10 0	7 6	10 6	8 2	10 14	7 8	10 4	7 8	128 2	18 5
4	Cross Sht.-horn	Aged	Jan. 26	1,000	11 12	7 11	11 10	7 7	11 11	7 4	9 12	7 10	11 6	7 8	11 0	7 12	11 2	7 9	131 2	18 12
5	Cross Sht.-horn	6	Nov. 17	1,176	8 11	6 0	8 10	7 4	8 7	6 15	8 2	6 3	8 7	7 3	7 12	7 6	8 6	6 4	105 10	15 1
6	Cross Sht.-horn	Aged	Jan. 13	1,121	12 15	8 13	12 6	9 12	12 2	9 13	12 0	9 2	12 7	9 12	12 0	8 10	12 2	9 0	150 14	21 9
7	Cross Sht.-horn	6	May 2	1,071	20 2	11 11	19 12	13 3	19 1	13 13	17 13	13 0	19 12	13 13	18 8	13 2	18 0	13 4	224 14	32 2
8	Cross Ayrshire	3	Apr. 13	824	11 12	8 1	12 4	8 0	11 12	7 15	11 10	8 1	11 5	8 0	10 12	7 0	10 12	7 12	135 0	19 5
9	Cross Sht.-horn	Aged	Feb. 16	1,116	12 1	8 11	12 7	9 7	12 15	12 14	11 6	8 12	11 7	9 3	11 14	8 6	12 1	9 10	151 2	21 9
10	Ayrshire -	6	Apr. 3	952	17 8	11 4	16 12	11 13	17 0	12 13	17 8	11 9	17 5	12 4	17 3	12 1	16 8	12 14	204 6	29 3
11	Guernsey -	4	Mar. 30	854	13 7	9 4	13 10	8 14	12 10	9 3	13 7	8 10	13 1	9 2	13 4	8 6	12 10	8 10	154 2	22 0
12	Cross Sht.-horn	7	Nov. 16	1,162	12 7	8 15	12 8	8 4	12 0	8 7	11 4	8 15	12 2	8 6	12 12	7 6	11 10	8 0	143 0	20 7
	Totals -			12,946	152 2	102 12	151 13	107 6	149 2	112 10	142 12	103 13	147 15	109 11	147 6	103 1	143 9	105 2	1,779 2	—
	Means -			1,079	12 11	8 9	12 11	8 15	12 7	9 6	11 14	8 11	12 5	9 2	12 5	8 9	11 15	8 12	148 4	21 3

* Unmeasured land; designated Plot 0 when unsewaged, and Plot 00 when sewaged. † Rye-grass. ‡ Not experimental.

Table IX.—*continued.*

Detailed Record of Food consumed, and Milk yielded, by Cows fed on the Unsewaged and Sewaged Meadow Grass, with Oilcake in addition.

Second Season, 1862; 7 days.—August 1 to August 7.

THREE COWS.—UNSEWAGED GRASS.

Food consumed.	Friday.	Saturday.	Sunday.	Monday.	Tuesday.	Wednesday.	Thurday.	Total in 7 days.	Per head per day.
Grass: From which Field, Plot, and Crop	Five-acre, Plot 1, Crop 1.	Five-acre, Plot 1, Crop 1.	—	—	Ten-acre, Plot 0*, Crop 2.	Ten-acre, Plot 0*, Crop 2.	—	—	—
	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.
Grass: Quantities weighed	0 2 1 17	0 1 2 22	– – – –	– – – –	0 6 0 3	0 5 3 24	– – – –	0 16 0 10	0 0 3 2
Oilcake	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0

Yield of Milk, &c. Cows Nos.	Breed.	Years old.	Dates of Calving.	Weights (July 24). lbs.	Friday A.M. lbs. ozs.	Friday P.M. lbs. ozs.	Saturday A.M. lbs. ozs.	Saturday P.M. lbs. ozs.	Sunday A.M. lbs. ozs.	Sunday P.M. lbs. ozs.	Monday A.M. lbs. ozs.	Monday P.M. lbs. ozs.	Tuesday A.M. lbs. ozs.	Tuesday P.M. lbs. ozs.	Wednesday A.M. lbs. ozs.	Wednesday P.M. lbs. ozs.	Thurday A.M. lbs. ozs.	Thurday P.M. lbs. ozs.	Total in 7 days. lbs. ozs.	Per head per day. lbs. ozs.
1	Cross Sht.-horn	6	Mar. 20	1,090	15 9	10 1	12 8	8 12	12 14	8 11	13 10	9 6	13 4	9 11	14 3	9 8	14 2	10 9	162 12	23 4
2	Cross Sht.-horn	7	Dec. 25	1,127	7 11	9 0	5 0	5 11	6 8	9 1	6 4	8 3	7 2	7 12	8 2	7 0	9 0	7 11	104 1	14 14
3	Cross Sht.-horn	Aged	Feb. 26	1,011	16 9	10 0	13 4	11 2	14 0	10 1	15 4	9 4	14 6	10 5	16 0	10 6	15 8	11 2	177 3	25 5
		Totals	-	3,228	39 13	29 1	30 12	25 9	33 6	27 13	35 2	26 13	34 12	27 12	38 5	26 14	38 10	29 6	444 0	—
		Means	-	1,076	13 4	9 11	10 4	8 9	11 2	9 4	11 12	8 15	11 9	9 4	12 12	8 15	12 14	9 13	148 0	21 2

TWELVE COWS.—SEWAGED GRASS.

Food consumed.	Friday.	Saturday.	Sunday.	Monday.	Tuesday.	Wednesday.	Thurday.	Total in 7 days.	Per head per day.
Grass: From which Field, Plot, and Crop	Five-acre, Plot 4, Crop 2.	Five-acre, Plot 4, Crop 2.	Five-acre, Plot 4, Crop 2.	†	†	†	†	—	—
	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.
Grass: Quantities weighed	0 9 3 10	0 9 3 5	0 11 3 8	0 9 1 22	0 14 2 2	0 17 2 14	0 10 3 27	4 4 0 4	0 1 0 0
Oilcake	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0

Yield of Milk, &c. Cows Nos.	Breed.	Years old.	Dates of Calving.	Weights (July 24). lbs.	Friday A.M. lbs. ozs.	Friday P.M. lbs. ozs.	Saturday A.M. lbs. ozs.	Saturday P.M. lbs. ozs.	Sunday A.M. lbs. ozs.	Sunday P.M. lbs. ozs.	Monday A.M. lbs. ozs.	Monday P.M. lbs. ozs.	Tuesday A.M. lbs. ozs.	Tuesday P.M. lbs. ozs.	Wednesday A.M. lbs. ozs.	Wednesday P.M. lbs. ozs.	Thurday A.M. lbs. ozs.	Thurday P.M. lbs. ozs.	Total in 7 days. lbs. ozs.	Per head per day. lbs. ozs.
1	Cross Sht.-horn	6	Nov. 18	1,192	11 14	8 2	11 8	8 10	11 10	9 1	12 0	9 0	11 9	8 14	12 0	8 9	11 7	8 8	142 12	20 6
2	Cross Sht.-horn	8	Feb. 2	1,246	8 9	6 7	8 7	6 0	7 12	6 10	8 2	5 14	8 0	6 5	8 12	6 14	8 8	6 10	102 14	14 11
3	Cross Sht.-horn	6	Dec. 1	1,232	10 5	7 8	10 3	7 6	10 2	8 1	11 0	7 14	10 1	7 6	10 11	7 0	10 2	7 1	124 12	17 13
4	Cross Sht.-horn	Aged	Jan. 26	1,000	10 10	7 9	11 14	8 4	11 1	8 2	11 2	7 4	10 4	8 3	11 12	7 14	11 5	8 4	133 8	19 1
5	Cross Sht.-horn	6	Nov. 17	1,176	9 2	6 8	7 14	6 10	7 14	6 5	8 12	6 4	7 6	6 8	9 1	6 8	8 11	6 12	104 3	14 14
6	Cross Sht.-horn	Aged	Jan. 13	1,121	12 3	9 3	12 5	8 12	12 2	9 11	13 3	9 1	12 7	8 11	12 4	8 13	12 4	9 0	149 15	21 7
7	Cross Sht.-horn	6	May 2	1,071	18 15	13 3	18 14	14 9	18 1	14 2	19 12	14 0	18 3	13 10	19 0	7 12	18 6	12 13	221 4	31 10
8	Cross Ayrshire	3	Apr. 13	824	12 0	7 14	11 7	8 5	11 12	8 14	13 0	8 4	11 2	8 6	11 12	9 3	12 4	7 15	142 2	20 5
9	Cross Sht.-horn	Aged	Feb. 16	1,116	11 12	9 6	11 8	9 8	10 2	9 13	11 4	7 15	10 3	9 11	11 14	8 11	10 15	9 8	142 2	20 5
10	Ayrshire	6	Apr. 3	952	17 12	11 7	17 5	12 7	17 1	11 14	18 7	12 2	16 15	12 3	17 8	12 13	18 3	11 11	207 12	29 11
11	Guernsey	4	Mar. 30	854	13 9	9 10	12 10	10 1	12 13	10 3	14 0	8 9	11 8	8 6	11 8	9 4	11 11	9 4	152 11	21 13
12	Cross Sht.-horn	7	Nov. 16	1,162	13 3	8 11	11 8	8 15	11 11	8 10	12 0	7 9	10 6	8 3	12 2	8 7	12 0	8 6	141 11	20 4
		Totals	-	12,946	149 14	105 8	145 7	109 7	142 1	111 6	152 10	103 12	138 0	106 6	147 15	101 12	145 12	105 12	1,765 10	—
		Means	-	1,079	12 8	8 13	12 2	9 2	11 13	9 4	12 12	8 10	11 8	8 14	12 5	8 8	12 2	8 13	147 2	21 0

Detailed Record of Food consumed, and Milk yielded, by Cows fed on the Unsewaged and Sewaged Meadow Grass, with Oilcake in addition.

Second Season, 1862 ; 7 days.—August 8 to August 14.

THREE COWS.—UNSEWAGED GRASS.

Food consumed.	Friday.	Saturday.	Sunday.	Monday.	Tuesday.	Wednesday.	Thursday.	Total in 7 days.	Per head per day.
Grass: From which Field, Plot, and Crop.	Ten-acre, Plot 0,* Crop 2.	†	†	†	†	†	†	—	—
	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.
Grass: Quantities weighed	0 7 1 13	0 6 0 0	0 3 0 13	0 3 0 13	0 4 0 16	0 5 1 11	0 3 3 12	1 12 3 22	0 1 2 8
Oilcake (rape-cake)	0 0 0 12	0 0 0 12	0 0 0 12	0 0 0 12	0 0 0 12	0 0 0 12	0 0 0 12	0 0 3 0	0 0 0 4

Yield of Milk, &c. Cows Nos.	Breed.	Years old.	Dates of Calving.	Weights (July 24). lbs.	Friday A.M.	Friday P.M.	Saturday A.M.	Saturday P.M.	Sunday A.M.	Sunday P.M.	Monday A.M.	Monday P.M.	Tuesday A.M.	Tuesday P.M.	Wednesday A.M.	Wednesday P.M.	Thursday A.M.	Thursday P.M.	Total in 7 days.	Per head per day.
					lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.
1	Cross Sht.-horn	6	Mar. 20	1,090	14 0	10 0	13 12	9 5	15 6	10 11	15 1	10 10	14 8	10 2	14 12	9 15	14 4	10 0	172 6	24 10
2	Cross Sht.-horn	7	Dec. 25	1,127	8 6	7 2	7 11	8 5	8 6	9 0	8 0	8 5	7 9	7 0	7 10	8 6	7 6	7 9	110 11	15 13
3	Cross Sht.-horn	Aged	Feb. 26	1,011	15 2	10 2	14 11	11 1	15 5	9 3	15 10	10 13	13 0	10 12	15 4	10 2	14 9	10 15	176 9	25 4
			Totals -	3,228	37 8	27 4	36 2	28 11	39 1	28 14	38 11	29 12	35 1	27 14	37 10	28 7	36 3	28 8	459 10	—
			Means -	1,076	12 8	9 1	12 1	9 9	13 0	9 10	12 14	9 14	11 11	9 5	12 9	9 8	12 1	9 8	153 3	21 14

TWELVE COWS.—SEWAGED GRASS.

Food consumed.	Friday.	Saturday.	Sunday.	Monday.	Tuesday.	Wednesday.	Thursday.	Total in 7 days.	Per head per day.
Grass: From which Field, Plot, and Crop.	‡	‡	‡	‡	‡	‡	‡	—	—
	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.
Grass: Quantities weighed	0 17 1 9	0 13 0 3	0 11 1 5	0 11 1 5	0 15 0 14	0 15 0 5	0 10 2 4	4 13 2 17	0 1 0 13
Oilcake (rape-cake)	0 0 1 20	0 0 1 20	0 0 1 20	0 0 1 20	0 0 1 20	0 0 1 20	0 0 1 20	0 3 0 0	0 0 0 4

Yield of Milk, &c. Cows Nos.	Breed.	Years old.	Dates of Calving.	Weights (July 24). lbs.	Friday A.M.	Friday P.M.	Saturday A.M.	Saturday P.M.	Sunday A.M.	Sunday P.M.	Monday A.M.	Monday P.M.	Tuesday A.M.	Tuesday P.M.	Wednesday A.M.	Wednesday P.M.	Thursday A.M.	Thursday P.M.	Total in 7 days.	Per head per day.
					lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.
1	Cross Sht.-horn	6	Nov. 18	1,192	11 12	8 6	11 12	8 10	12 0	9 14	11 12	8 5	11 10	8 9	11 13	8 15	11 12	8 12	143 14	20 9
2	Cross Sht.-horn	8	Feb. 2	1,246	8 4	6 10	9 0	6 2	9 1	7 5	9 6	6 10	9 12	6 10	9 10	5 8	8 9	6 12	109 3	15 10
3	Cross Sht.-horn	6	Dec. 1	1,232	9 0	7 0	10 4	7 6	10 2	8 2	10 4	7 7	10 3	7 6	10 10	7 9	10 2	7 12	123 3	17 10
4	Cross Sht.-horn	Aged	Jan. 26	1,000	11 4	8 9	11 2	7 10	11 6	7 12	10 12	7 6	11 2	8 1	11 8	7 12	10 4	8 4	132 12	18 15
5	Cross Sht.-horn	6	Nov. 17	1,176	8 6	6 15	8 14	6 5	8 7	7 2	8 8	5 11	7 12	6 14	9 0	6 8	8 13	6 12	105 15	15 2
6	Cross Sht.-horn	Aged	Jan. 13	1,121	12 10	8 4	12 4	8 12	12 6	9 15	11 14	9 3	13 0	9 0	12 13	8 15	12 11	9 13	151 8	21 10
7	Cross Sht.-horn	6	May 2	1,071	18 0	13 2	18 5	13 6	18 7	14 9	18 14	13 0	18 0	12 14	18 4	12 13	18 1	14 4	221 15	31 11
8	Cross Ayrshire	3	Apr. 13	824	11 4	8 6	11 7	8 7	12 0	8 4	12 5	7 11	10 8	7 8	11 13	8 0	11 7	8 6	137 6	19 10
9	Cross Sht.-horn	Aged	Feb. 16	1,116	10 0	9 4	11 11	8 8	12 0	9 5	12 4	7 8	12 13	9 6	13 0	8 13	12 8	9 5	146 5	20 14
10	Ayrshire -	6	Apr. 3	952	17 0	11 14	17 15	11 10	17 6	12 12	17 8	10 14	17 6	11 15	18 6	11 13	18 2	12 7	207 0	29 9
11	Guernsey -	4	Mar. 30	854	12 8	8 10	11 6	8 8	12 8	9 8	13 1	8 5	12 0	10 3	13 0	9 8	12 7	9 6	150 14	21 9
12	Cross Sht.-horn	7	Nov. 16	1,162	11 2	8 10	11 14	7 14	12 2	8 3	12 0	8 3	11 12	8 10	11 13	8 4	12 2	8 12	141 5	20 3
			Totals -	12,946	141 2	105 10	145 14	103 2	147 13	112 11	148 8	100 3	145 14	107 0	151 10	104 6	146 14	110 9	1,771 4	—
			Means -	1,079	11 12	8 13	12 2	8 10	12 5	9 6	12 6	8 6	12 3	8 15	12 10	8 11	12 4	9 3	147 10	21 1

* Unmeasured land, designated Plot 0 when unsewaged. † Clover. ‡ Not experimental.

Table IX.—*continued.*

Detailed Record of Food consumed, and Milk yielded, by Cows fed on the Unsewaged and Sewaged Meadow Grass, with Oilcake in addition.

Second Season, 1862 ; 7 days.—August 15 to August 21.

					Friday.		Saturday.		Sunday.		Monday.		Tuesday.		Wednesday.		Thursday.		Total in 7 days.	Per head per day.
Three Cows.—Unsewaged Grass.																				
Food consumed. Grass: From which Field, Plot, and Crop.					—		*		*		*		*		*		*		—	—
					tons. cwts. qrs. lbs.		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*
Grass: Quantities weighed					—		0 4 2 15		0 1 3 4		0 1 3 4		0 3 3 5		0 2 0 12		0 2 3 10		0 16 3 22	0 0 3 6
Oilcake (rape-cake)					0 0 0 12		0 0 0 12		0 0 0 12		0 0 0 12		0 0 0 12		0 0 0 12		0 0 0 12		0 0 3 0	0 0 0 4
Yield of Milk, &c. Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (Aug. 21). *lbs.*	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	—	—
					lbs. ozs.	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*
1	Cross Sht.-horn	6	Mar. 20	1,076	14 4	10 9	15 6	10 13	15 1	10 12	15 12	10 1	15 0	10 6	14 12	10 10	15 2	8 10	177 2	25 5
2	Cross Sht.-horn	7	Dec. 25	1,170	7 0	8 10	8 7	7 14	6 13	8 5	7 4	8 0	8 2	8 0	7 14	8 1	7 13	7 5	109 6	15 10
3	Cross Sht.-horn	Aged	Feb. 26	1,012	15 0	9 8	16 0	11 0	15 11	10 8	15 10	10 8	14 6	10 1	14 14	11 1	14 15	9 10	178 12	25 9
		Totals	-	3,258	36 4	28 11	39 13	29 11	37 9	29 7	38 10	28 9	37 8	28 7	37 8	29 12	37 14	25 9	465 4	—
		Means	-	1,086	12 1	9 9	13 4	9 14	12 9	9 13	12 14	9 8	12 8	9 8	12 8	9 15	12 10	8 8	155 1	22 2
Twelve Cows.—Sewaged Grass.																				
Food consumed. Grass: From which Field, Plot, and Crop -					†		†		†		†		†		Ten-acre, Plot 2, Crop 2.		Ten-acre, Plot 2, Crop 2.		—	—
					tons. cwts. qrs. lbs.		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*
Grass: Quantities weighed					0 17 0 27		0 15 1 9		0 14 1 13		0 14 1 13		0 18 2 11		0 15 0 15		0 9 1 11		5 4 1 15	0 1 0 27
Oilcake (rape-cake					0 0 1 20		0 0 1 20		0 0 1 20		0 0 1 20		0 0 1 20		0 0 1 20		0 0 1 20		0 3 0 0	0 0 0 4
Yield of Milk, &c. Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (Aug. 21). *lbs.*	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	—	—
					lbs. ozs.	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*
1	Cross Sht.-horn	6	Nov. 18	1,224	11 12	8 0	11 10	8 6	11 10	8 11	10 2	8 0	11 10	8 5	11 8	8 2	11 0	8 10	137 6	19 10
2	Cross Sht.-horn	8	Feb. 2	1,237	8 11	6 8	8 9	6 12	8 9	7 0	8 7	6 1	8 12	6 7	8 4	6 3	8 0	6 1	104 4	14 14
3	Cross Sht.-horn	6	Dec. 1	1,224	10 6	7 8	10 11	7 4	10 7	8 0	9 11	7 8	10 11	7 6	10 0	7 11	9 1	7 3	123 7	17 10
4	Cross Sht.-horn	Aged	Jan. 26	973	11 3	6 14	11 1	7 11	11 0	7 3	11 2	7 6	11 0	7 10	11 0	7 0	10 7	6 14	127 7	18 3
5	Cross Sht.-horn	6	Nov. 17	1,158	9 9	6 4	9 7	6 10	9 6	7 7	8 12	6 4	9 1	6 6	9 4	6 7	9 2	6 9	110 8	15 13
6	Cross Sht.-horn	Aged	Jan. 13	1,125	12 10	9 3	12 6	8 14	12 3	9 4	12 0	8 7	12 4	9 0	12 2	8 7	12 4	8 12	147 12	21 2
7	Cross Sht.-horn	6	May 2	1,109	17 15	13 5	18 0	13 10	17 9	14 4	17 6	12 6	17 2	13 1	17 7	12 13	16 5	13 1	214 4	30 10
8	Cross Ayrshire	3	Apr. 13	834	12 4	8 1	12 13	8 10	12 4	8 3	12 2	8 0	11 7	8 12	12 7	7 14	11 0	8 4	142 1	20 5
9	Cross Sht.-horn	Aged	Feb. 16	1,136	12 2	9 0	13 0	9 2	10 5	10 8	12 3	8 14	11 3	10 0	12 3	8 10	11 14	9 8	148 8	21 3
10	Ayrshire -	6	Apr. 3	950	17 9	11 7	18 9	11 10	18 0	10 15	18 1	10 10	17 3	11 0	16 10	10 13	16 0	12 3	200 10	28 11
11	Guernsey -	4	Mar. 30	854	12 11	9 6	13 4	9 6	12 2	8 11	12 12	9 0	13 12	9 2	12 2	9 11	12 6	9 6	153 11	21 15
12	Cross Sht.-horn	7	Nov. 16	1,155	11 12	8 10	12 0	8 4	13 0	7 15	12 1	7 5	10 12	8 6	10 13	7 10	10 8	8 0	137 0	19 9
		Totals	-	12,979	148 8	104 2	151 6	106 5	146 7	108 1	144 11	99 13	144 13	105 7	143 12	101 5	137 15	104 7	1,746 14	—
		Means	-	1,082	12 6	8 11	12 10	8 13	12 3	9 0	12 1	8 5	12 1	8 13	12 0	8 7	11 8	8 11	145 9	20 13

* Clover. †Not experimental.

Detailed Record of Food consumed, and Milk yielded, by Cows fed on the Unsewaged and Sewaged Meadow Grass, with Oilcake in addition.

Second Season, 1862 ; 7 days.—August 22 to August 28.

Three Cows.—Unsewaged Grass.

Food consumed.	Friday.	Saturday.	Sunday.	Monday.	Tuesday.	Wednesday.	Thursday.	Total in 7 days.	Per head per day.
Grass: From which Field, Plot, and Crop.	*	*	*	*	*	*	*	—	—
	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.
Grass: Quantities weighed	0 3 1 12	0 4 3 0	0 2 2 27	0 2 2 26	0 3 2 24	0 3 2 0	0 1 3 1	1 2 2 6	0 1 0 8
Oilcake (equal parts linseed and rape cake)	0 0 0 12	0 0 0 12	0 0 0 12	0 0 0 12	0 0 0 12	0 0 0 12	0 0 0 12	0 0 3 0	0 0 0 4

Yield of Milk, &c. Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (Aug. 21). *lbs.*	Friday A.M.	Friday P.M.	Saturday A.M.	Saturday P.M.	Sunday A.M.	Sunday P.M.	Monday A.M.	Monday P.M.	Tuesday A.M.	Tuesday P.M.	Wednesday A.M.	Wednesday P.M.	Thursday A.M.	Thursday P.M.	Total in 7 days.	Per head per day.
					lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.
1	Cross Sht.-horn	6	Mar. 20	1,076	15 3	12 0	16 2	11 13	16 8	10 9	15 8	10 12	15 0	12 0	14 5	9 12	14 6	11 12	185 10	26 8
2	Cross Sht.-horn	7	Dec. 25	1,170	9 6	7 0	7 8	7 6	7 8	7 6	6 12	6 12	7 15	6 5	6 12	6 6	6 0	8 0	101 0	14 7
3	Cross Sht.-horn	Aged	Feb. 26	1,012	15 10	10 8	16 4	10 11	16 3	10 4	16 2	10 4	15 4	11 1	15 4	10 9	15 4	11 3	184 7	26 6
	Totals -			3,258	40 3	29 8	39 14	29 14	40 3	28 3	38 6	27 12	38 3	29 6	36 5	26 11	35 10	30 15	471 1	—
	Means -			1,086	13 6	9 13	13 5	9 15	13 6	9 6	12 13	9 4	12 12	9 13	12 2	8 14	11 14	10 5	157 0	22 7

Twelve Cows.—Sewaged Grass.

Food consumed.	Friday.	Saturday.	Sunday.	Monday.	Tuesday.	Wednesday.	Thursday.	Total in 7 days.	Per head per day.
Grass: From which Field, Plot, and Crop.	Ten-acre, Plot 2, Crop 2.	Ten-acre, Plot 2, Crop 2.	Ten-acre, Plot 2, Crop 2.	Ten-acre, Plot 2, Crop 2.	Ten-acre, Plot 2, Crop 2.	Ten-acre, Plot 2, Crop 2.	Ten-acre, Plots 00† and 2, Crop 2, and Plot 4, Crop 3.	—	—
	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.
Grass: Quantities weighed	0 15 0 11	0 17 0 19	0 18 0 17	0 18 0 22	0 12 2 25	0 17 0 1	0 16 0 24	5 14 2 7	0 1 1 13
Oilcake (equal parts linseed and rape cake)	0 0 1 20	0 0 1 20	0 0 1 20	0 0 1 20	0 0 1 20	0 0 1 20	0 0 1 20	0 3 0 0	0 0 0 4

Yield of Milk, &c. Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (Aug. 21). *lbs.*	Friday A.M.	Friday P.M.	Saturday A.M.	Saturday P.M.	Sunday A.M.	Sunday P.M.	Monday A.M.	Monday P.M.	Tuesday A.M.	Tuesday P.M.	Wednesday A.M.	Wednesday P.M.	Thursday A.M.	Thursday P.M.	Total in 7 days.	Per head per day.
					lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.
1	Cross Sht.-horn	6	Nov. 18	1,224	11 4	8 0	11 0	7 12	11 10	8 2	11 0	8 1	11 2	8 9	11 12	8 4	11 6	8 12	136 10	19 8
2	Cross Sht.-horn	8	Feb. 2	1,237	8 0	6 1	8 1	6 2	8 10	6 3	7 10	6 0	7 3	6 3	9 0	6 3	8 0	6 13	100 1	14 5
3	Cross Sht.-horn	6	Dec. 1	1,224	9 8	7 8	10 4	7 9	10 4	7 5	9 0	7 1	9 5	6 5	10 8	7 0	9 12	7 8	118 13	17 0
4	Cross Sht.-horn	Aged	Jan. 26	973	10 6	7 2	10 0	6 15	10 11	7 5	8 10	7 0	9 8	7 14	11 0	7 0	7 6	7 11	118 8	16 15
5	Cross Sht.-horn	6	Nov. 17	1,158	8 8	6 1	8 12	6 3	8 9	6 6	8 11	5 10	7 11	7 0	8 11	6 1	8 0	6 9	102 12	14 11
6	Cross Sht.-horn	Aged	Jan. 13	1,125	13 0	8 13	12 2	9 9	12 7	8 10	12 12	7 12	11 8	9 2	12 8	9 1	12 8	9 4	149 0	21 5
7	Cross Sht.-horn	6	May 2	1,109	17 2	13 1	18 2	12 2	17 13	12 6	17 5	11 8	15 10	11 0	17 5	10 1	16 13	12 4	202 8	28 15
8	Cross Ayrshire	3	Apr. 13	834	11 13	7 12	12 6	8 3	12 10	8 8	12 6	7 10	10 12	9 7	12 5	8 1	11 11	8 2	141 10	20 4
9	Cross Sht.-horn	Aged	Feb. 16	1,136	11 6	9 6	12 0	8 13	11 4	8 3	11 6	7 10	10 8	9 14	12 6	8 8	11 12	8 4	141 4	20 3
10	Ayrshire -	6	Apr. 3	950	17 3	11 6	17 7	12 1	16 10	10 12	15 14	10 4	14 0	12 6	17 6	10 14	16 9	11 10	194 6	27 12
11	Guernsey -	4	Mar. 30	854	12 10	9 4	12 14	8 7	13 2	8 12	12 5	8 8	11 1	10 6	12 3	9 3	12 13	9 0	150 8	21 8
12	Cross Sht.-horn	7	Nov. 16	1,155	11 0	7 2	11 8	6 6	10 1	7 8	10 14	7 6	11 6	7 14	10 1	6 15	11 12	7 14	127 11	18 4
	Totals -			12,979	141 12	101 8	144 8	100 2	143 11	100 0	137 13	94 6	129 10	106 0	145 1	97 3	138 6	103 11	1,683 11	—
	Means -			1,082	11 13	8 7	12 1	8 5	12 0	8 5	11 8	7 14	10 13	8 13	12 1	8 2	11 9	8 10	140 5	20 1

* Clover.

† Unmeasured land, designated Plot 00 when sewaged.

Table IX.—*continued.*

Detailed Record of Food consumed, and Milk yielded, by Cows fed on the Unsewaged and Sewaged Meadow Grass, with Oilcake in addition.

Second Season, 1862; 7 days.—August 29 to September 4.

THREE COWS.—UNSEWAGED GRASS.

					Friday. A.M.	Friday. P.M.	Saturday. A.M.	Saturday. P.M.	Sunday. A.M.	Sunday. P.M.	Monday. A.M.	Monday. P.M.	Tuesday. A.M.	Tuesday. P.M.	Wednesday. A.M.	Wednesday. P.M.	Thursday. A.M.	Thursday. P.M.	Total in 7 days.	Per head per day.
Food consumed. Grass: From which Field, Plot, and Crop.					Ten-acre, Plot 1, Crop 2.		Ten-acre, Plot 1, Crop 2.		Ten-acre, Plot 1, Crop 2.		Ten-acre, Plot 1, Crop 2.		Ten-acre, Plot 1, Crop 2.		Ten-acre, Plot 1, Crop 2.		Ten-acre, Plot 1, Crop 2.		—	—
Grass: Quantities weighed (tons, cwts., qrs., lbs.)					0 2 2 3½		0 2 1 25½		0 1 2 22½		0 1 2 24		0 2 2 11½		0 3 3 11½		0 3 3 1½		0 18 2 16	0 0 3 15
Oilcake (equal parts linseed and rape cake) (tons, cwts., qrs., lbs.)					0 0 0 12		0 0 0 12		0 0 0 12		0 0 0 12		0 0 0 12		0 0 0 12		0 0 0 12		0 0 3 0	0 0 0 4
Yield of Milk, &c. Cows Nos.	Breed.	Years old.	Dates of Calving.	Weights (Aug. 21). lbs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.
1	Cross Sht.-horn	6	Mar. 20	1,076	15 0	11 12	16 0	10 8	15 12	10 1	14 6	9 6	14 4	11 1	13 10	9 14	14 6	10 12	176 12	25 4
2	Cross Sht.-horn	7	Dec. 25	1,170	7 8	5 9	7 14	7 8	6 1	6 10	6 0	7 10	5 10	6 15	6 0	7 10	6 8	6 8	93 15	13 7
3	Cross Sht.-horn	Aged	Feb. 26	1,012	17 0	10 6	16 2	12 0	16 3	10 10	16 3	10 2	16 6	10 4	17 2	11 1	16 0	11 4	190 11	27 4
		Totals	-	3,258	39 8	27 11	40 0	30 0	38 0	27 5	36 9	27 2	36 4	28 4	36 12	28 9	36 14	28 8	461 6	—
		Means	-	1,086	13 3	9 4	13 5	10 0	12 11	9 2	12 3	9 1	12 1	9 6	12 4	9 8	12 5	9 8	153 13	22 0

TWELVE COWS.—SEWAGED GRASS.

					Friday. A.M.	Friday. P.M.	Saturday. A.M.	Saturday. P.M.	Sunday. A.M.	Sunday. P.M.	Monday. A.M.	Monday. P.M.	Tuesday. A.M.	Tuesday. P.M.	Wednesday. A.M.	Wednesday. P.M.	Thursday. A.M.	Thursday. P.M.	Total in 7 days.	Per head per day.
Food consumed. Grass: From which Field, Plot, and Crop.					Ten-acre, Plot 4, Crop 3.		Ten-acre, Plot 4, Crop 3.		Ten-acre, Plot 4, Crop 3.		Ten-acre, Plot 4, Crop 3.		Ten-acre, Plot 4, Crop 3.		Ten-acre, Plot 4, Crop 3.		Ten-acre, Plot 4, Crop 3.		—	—
Grass: Quantities weighed (tons, cwts., qrs., lbs.)					0 18 0 9		0 14 2 5		0 5 0 23		0 5 1 1		0 13 2 14		0 15 2 12		0 13 1 25		4 5 3 5	0 1 0 2
Oilcake (equal parts linseed and rape cake) (tons, cwts., qrs., lbs.)					0 0 1 20		0 0 1 20		0 0 1 20		0 0 1 20		0 0 1 20		0 0 1 20		0 0 1 20		0 3 0 0	0 0 0 4
Yield of Milk, &c. Cows Nos.	Breed.	Years old.	Dates of Calving.	Weights (Aug. 21). lbs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.
1	Cross Sht.-horn	6	Nov. 18	1,224	11 13	8 7	11 10	8 0	11 11	8 7	11 3	7 12	11 4	8 7	11 13	8 2	11 12	8 10	138 15	19 14
2	Cross Sht.-horn	8	Feb. 2	1,237	8 6	5 8	8 3	5 14	8 4	5 13	7 12	5 14	8 2	6 2	8 12	5 13	8 7	6 2	99 0	14 2
3	Cross Sht.-horn	6	Dec. 1	1,224	10 3	7 0	10 0	6 9	8 0	8 3	8 4	6 4	8 14	7 0	9 8	6 3	9 6	6 10	112 0	16 0
4	Cross Sht.-horn	Aged	Jan. 26	973	10 8	7 0	10 5	6 13	10 0	6 10	9 6	6 8	9 1	6 14	9 6	6 9	9 0	7 5	115 5	16 8
5	Cross Sht.-horn	6	Nov. 17	1,158	9 0	5 10	8 14	6 12	8 0	6 4	7 9	5 2	7 4	5 10	7 10	5 12	7 11	6 1	97 3	13 14
6	Cross Sht.-horn	Aged	Jan. 13	1,125	12 13	8 15	12 11	8 4	12 10	8 6	12 13	7 10	12 0	8 6	12 9	7 15	12 2	8 10	145 12	20 13
7	Cross Sht.-horn	6	May 2	1,109	17 2	12 2	17 14	11 12	17 6	12 15	16 8	10 12	17 3	12 8	17 4	12 2	16 7	11 15	203 14	29 2
8	Cross Ayrshire	3	Apr. 13	834	11 7	7 9	12 10	7 13	11 14	8 8	11 11	7 0	11 5	8 8	12 4	7 4	11 6	8 0	137 3	19 10
9	Cross Sht.-horn	Aged	Feb. 16	1,136	12 11	8 4	12 1	8 4	12 6	9 0	11 4	7 8	12 12	9 5	13 1	8 7	12 5	8 8	145 12	20 13
10	Ayrshire -	6	Apr. 3	950	17 2	11 2	16 1	10 10	15 7	11 9	15 0	8 10	14 6	10 14	16 7	10 1	14 10	10 6	182 5	26 1
11	Guernsey -	4	Mar. 30	854	12 6	9 0	13 0	7 11	12 5	8 15	12 2	6 14	11 5	9 6	12 5	8 1	12 3	7 5	142 14	20 7
12	Cross Sht.-horn	7	Nov. 16	1,155	10 1	7 5	9 6	6 10	9 4	6 14	11 1	5 15	10 1	7 3	8 4	6 1	9 8	6 11	114 4	16 5
		Totals	-	12,979	143 8	97 14	142 11	95 0	137 3	101 8	134 9	85 13	133 9	100 3	139 3	92 6	134 13	96 3	1,634 7	—
		[illegible]		[illegible]	11 15	8 3	11 14	7 15	11 7	8 7	11 3	7 2	11 2	8 6	11 10	7 11	11 4	8 0	136 3	19 7

Table IX.—*continued.*

Detailed Record of Food consumed, and Milk yielded, by Cows fed on the Unsewaged and Sewaged Meadow Grass, with Oilcake in addition.

Second Season, 1862 ; 7 days.—September 5 to September 11.

					Friday.		Saturday.		Sunday.		Monday.		Tuesday.		Wednesday.		Thursday.		Total in 7 days.	Per head per day.
Three Cows.—Unsewaged Grass.																				
Food consumed. Grass	From which Field, Plot, and Crop.				Ten-acre, Plot 1, Crop 2.		Ten-acre, Plot 1, Crop 2.		Ten-acre, Plot 1, Crop 2.		Ten-acre, Plot 1, Crop 2.		Ten-acre, Plot 1, Crop 2.		Ten-acre, Plot 1, Crop 2.		Ten-acre, Plot 1, Crop 2.		—	—
					tons. cwts. qrs. lbs.		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*
Grass	Quantities weighed - - -				0 3 2 11½		0 3 1 22½		0 4 0 14½		0 4 0 17		0 3 3 24½		0 3 0 24½		0 3 3 4½		1 6 1 7	0 1 1 0
Oilcake (equal parts linseed and rape cake) -					0 0 0 12		0 0 0 12		0 0 0 12		0 0 0 12		0 0 0 12		0 0 0 12		0 0 0 12		0 0 3 0	0 0 0 4
Yield of Milk, &c. Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (Aug. 21). *lbs.*	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	—	—
					lbs. ozs.	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*
1	Cross Sht.-horn	6	Mar. 20	1,076	15 2	9 8	14 14	9 8	14 4	10 3	15 3	10 6	15 0	10 15	16 0	11 0	14 6	10 7	176 12	25 4
2	Cross Sht.-horn	7	Dec. 25	1,170	7 8	6 9	7 14	5 7	4 10	9 2	5 5	6 12	6 12	7 15	7 1	5 13	6 8	6 14	94 2	13 7
3	Cross Sht.-horn	Aged	Feb. 26	1,012	16 11	10 12	16 7	10 8	16 1	10 10	16 8	11 2	17 0	10 15	16 4	11 9	16 2	10 10	191 3	27 5
		Totals	-	3,258	39 5	26 13	39 3	25 7	34 15	29 15	37 0	28 4	38 12	29 13	39 5	28 6	37 0	27 15	462 1	—
		Means	-	1,086	13 2	8 15	13 1	8 8	11 10	10 0	12 5	9 6	12 15	9 15	13 2	9 7	12 5	9 5	154 0	22 0
Twelve Cows.—Sewaged Grass.																				
Food consumed. Grass	From which Field, Plot, and Crop.				Ten-acre, Plot 4, Crop 3.		Ten-acre, Plot 4, Crop 3.		Ten-acre, Plots 3 and 4, Crop 3.		Ten-acre, Plots 3 and 4, Crop 3.		Ten-acre, Plot 3, Crop 3.		Ten-acre, Plot 3, Crop 3.		Ten-acre, Plot 3, Crop 3.		—	—
					tons. cwts. qrs. lbs.		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*
Grass	Quantities weighed - - -				0 18 0 11		1 8 2 14		0 15 3 15		0 15 3 21		0 5 1 24		0 16 1 4		0 17 0 26		5 17 2 3	0 1 1 17
Oilcake (equal parts linseed and rape cake) -					0 0 1 20		0 0 1 20		0 0 1 20		0 0 1 20		0 0 1 20		0 0 1 20		0 0 1 20		0 3 0 0	0 0 0 4
Yield of Milk, &c. Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (Aug. 21). *lbs.*	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	—	—
					lbs. ozs.	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*
1	Cross Sht.-horn	6	Nov. 18	1,224	11 8	8 8	11 12	8 13	11 14	8 12	11 9	7 8	11 1	7 14	11 12	7 5	11 9	8 0	137 13	19 11
2	Cross Sht.-horn	8	Feb. 2	1,237	8 2	6 11	8 6	5 14	7 6	5 9	7 6	5 6	7 0	5 7	8 1	5 0	7 12	5 6	93 6	13 5
3	Cross Sht.-horn	6	Dec. 1	1,224	9 3	6 12	8 12	6 12	9 1	6 8	8 14	6 0	7 12	6 12	9 2	5 10	8 11	5 15	105 12	15 2
4	Cross Sht.-horn	Aged	Jan. 26	973	9 7	6 4	9 10	7 1	9 4	6 11	8 9	7 0	8 9	6 4	9 13	6 2	8 15	6 3	109 12	15 11
5	Cross Sht.-horn	6	Nov. 17	1,158	7 8	5 7	7 7	5 15	7 2	5 8	7 10	5 1	7 2	5 8	6 8	6 1	7 0	5 3	89 0	12 11
6	Cross Sht.-horn	Aged	Jan. 13	1,125	12 3	8 11	12 3	8 8	12 1	9 0	11 1	7 13	11 10	8 5	12 0	7 13	11 4	8 3	140 11	20 2
7	Cross Sht.-horn	6	May 2	1,109	16 3	12 10	15 14	12 7	17 4	11 8	14 11	11 0	14 0	11 11	16 2	12 0	15 7	11 1	191 14	27 7
8	Cross Ayrshire	3	Apr. 13	834	13 1	8 13	13 0	8 3	12 14	7 10	11 6	7 2	11 0	8 2	13 1	7 13	12 0	7 11	141 12	20 4
9	Cross Sht.-horn	Aged	Feb. 16	1,136	12 4	8 12	11 8	8 11	10 2	8 11	9 12	8 10	10 12	8 1	11 1	7 8	10 12	8 1	134 9	19 4
10	Ayrshire -	6	Apr. 3	950	15 14	10 11	15 8	9 10	16 11	9 1	14 4	9 8	15 4	10 12	15 14	10 3	14 2	10 6	177 12	25 6
11	Guernsey -	4	Mar. 30	854	12 0	7 14	12 12	9 7	12 0	6 14	11 0	8 0	11 1	8 8	12 8	7 9	8 11	9 11	137 15	19 11
12	Cross Sht.-horn	7	Nov. 16	1,155	9 6	6 12	10 4	6 13	10 8	7 5	10 6	8 2	11 9	7 11	12 6	8 8	11 6	8 14	129 14	18 9
		Totals	-	12,979	136 11	97 13	137 0	98 2	136 3	93 1	126 8	91 2	126 12	94 15	138 4	91 8	127 9	94 10	1,590 2	—
		Means	-	1,082	11 6	8 2	11 7	8 3	11 6	7 12	10 9	7 9	10 9	7 15	11 8	7 10	10 10	7 14	132 8	18 15

Table IX.—*continued.*

Detailed Record of Food consumed, and Milk yielded, by Cows fed on the Unsewaged and Sewaged Meadow Grass, with Oilcake in addition.

Second Season, 1862 ; 7 days.—September 12 to September 18.

THREE COWS.—UNSEWAGED GRASS.

Food consumed.	Friday.	Saturday.	Sunday.	Monday.	Tuesday.	Wednesday.	Thursday.	Total in 7 days.	Per head per day.
Grass: From which Field, Plot, and Crop.	Ten-acre, Plot 1, Crop 2.	Ten-acre, Plot 1, Crop 2.	Ten-acre, Plot 1, Crop 2.	Ten-acre, Plot 1, Crop 2.	*	*	*	—	—
	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.
Grass: Quantities weighed - - -	0 4 1 17½	0 3 1 4½	0 3 1 7½	0 3 1 10	0 4 1 6	0 3 3 3	0 3 3 6	1 6 0 26½	0 1 1 0
Oilcake (equal parts linseed and rape cake) -	0 0 0 12	0 0 0 12	0 0 0 12	0 0 0 12	0 0 0 12	0 0 0 12	0 0 0 12	0 0 3 0	0 0 0 4

Yield of Milk, &c. Cows Nos.	Breed.	Years old.	Dates of Calving.	Weights (Sept. 18). lbs.	Friday A.M. lbs. ozs.	Friday P.M. lbs. ozs.	Saturday A.M. lbs. ozs.	Saturday P.M. lbs. ozs.	Sunday A.M. lbs. ozs.	Sunday P.M. lbs. ozs.	Monday A.M. lbs. ozs.	Monday P.M. lbs. ozs.	Tuesday A.M. lbs. ozs.	Tuesday P.M. lbs. ozs.	Wednesday A.M. lbs. ozs.	Wednesday P.M. lbs. ozs.	Thursday A.M. lbs. ozs.	Thursday P.M. lbs. ozs.	Total in 7 days lbs. ozs.	Per head per day lbs. ozs.
1	Cross Sht.-horn	6	Mar. 20	1,066	14 15	11 6	14 15	11 10	11 10	9 14	15 0	10 6	12 4	10 0	13 9	11 4	13 4	9 8	169 9	24 4
2	Cross Sht.-horn	7	Dec. 25	1,190	6 0	7 6	6 1	8 8	6 4	6 11	7 1	7 9	5 0	6 6	6 0	5 9	5 15	5 10	90 0	12 14
3	Cross Sht.-horn	Aged	Feb. 26	1,020	16 12	11 8	16 4	11 5	16 4	9 10	14 10	11 3	12 10	9 12	15 0	11 3	14 10	10 2	180 13	25 13
			Totals -	3,276	37 11	30 4	37 4	31 7	34 2	26 3	36 11	29 2	29 14	26 2	34 9	28 0	33 13	25 4	440 6	—
			Means -	1,092	12 9	10 1	12 7	10 8	11 6	8 12	12 4	9 11	9 15	8 11	11 9	9 5	11 4	8 7	146 13	21 0

TWELVE COWS.—SEWAGED GRASS.

Food consumed.	Friday.	Saturday.	Sunday.	Monday.	Tuesday.	Wednesday.	Thursday.	Total in 7 days.	Per head per day.
Grass: From which Field, Plot, and Crop.	Ten-acre, Plot 3, Crop 3.	Ten-acre, Plot 3, Crop 3.	Ten-acre, Plot 3, Crop 3.	Ten-acre, Plot 3, Crop 3.	Ten-acre, Plot 3, Crop 3.	Ten-acre, Plot 3. Crop 3.	Ten-acre, Plot 3, Crop 3.	—	—
	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.	tons. cwts. qrs. lbs.
Grass: Quantities weighed - - -	0 15 2 10	0 15 2 15	0 16 3 8	0 15 3 8	1 0 3 26	0 17 1 15	1 0 2 23	6 2 3 21	0 1 1 24
Oilcake (equal parts linseed and rape cake) -	0 0 1 20	0 0 1 20	0 0 1 20	0 0 1 20	0 0 1 20	0 0 1 20	0 0 1 20	0 3 0 0	0 0 0 4

Yield of Milk, &c. Cows Nos.	Breed.	Years old.	Dates of Calving.	Weights (Sept. 18.) lbs.	Friday A.M. lbs. ozs.	Friday P.M. lbs. ozs.	Saturday A.M. lbs. ozs.	Saturday P.M. lbs. ozs.	Sunday A.M. lbs. ozs.	Sunday P.M. lbs. ozs.	Monday A.M. lbs. ozs.	Monday P.M. lbs. ozs.	Tuesday A.M. lbs. ozs.	Tuesday P.M. lbs. ozs.	Wednesday A.M. lbs. ozs.	Wednesday P.M. lbs. ozs.	Thursday A.M. lbs. ozs.	Thursday P.M. lbs. ozs.	Total in 7 days lbs. ozs.	Per head per day lbs. ozs.
1	Cross Sht.-horn	6	Nov. 18	1,270	11 6	8 3	10 14	7 14	13 4	8 11	11 8	7 8	11 4	8 4	11 0	7 12	10 12	7 14	136 2	19 7
2	Cross Sht.-horn	8	Feb. 2	1,267	7 8	5 0	7 6	5 3	8 14	6 11	7 8	5 1	7 6	5 10	7 9	5 8	7 4	5 6	91 14	13 2
3	Cross Sht.-horn	6	Dec. 1	1,288	8 14	6 1	8 2	6 9	9 6	7 5	7 10	6 0	7 8	6 7	8 2	6 0	8 0	6 9	102 9	14 10
4	Cross Sht.-horn	Aged	Jan. 26	973	9 8	6 6	8 14	6 12	11 12	7 6	9 4	6 3	8 0	5 10	8 11	6 3	8 6	5 1	108 0	15 7
5	Cross Sht.-horn	6	Nov. 17	1,199	7 6	5 4	6 8	6 6	8 14	6 8	7 6	5 0	7 0	5 1	6 13	5 0	6 10	4 13	88 9	12 10
6	Cross Sht.-horn	Aged	Jan. 13	1,150	11 6	7 12	11 4	8 10	13 0	8 10	11 2	7 12	10 8	8 10	11 2	7 13	10 10	7 8	135 11	19 6
7	Cross Sht.-horn	6	May 2	1,106	14 6	11 11	15 0	17 8	17 12	10 7	13 1	12 8	13 10	11 3	15 9	11 6	15 0	11 0	190 1	27 2
8	Cross Ayrshire	3	Apr. 13	850	11 12	8 4	11 13	8 1	13 12	7 7	13 0	7 9	10 0	8 1	11 7	7 5	10 4	7 3	135 14	19 7
9	Cross Sht.-horn	Aged	Feb. 16	1,232	10 6	7 4	9 12	8 4	11 4	8 14	10 10	7 13	9 0	7 14	10 3	8 4	10 14	7 4	127 10	18 4
10	Ayrshire -	6	Apr. 3	960	15 8	10 8	14 13	10 2	17 8	9 13	14 8	10 2	14 2	10 6	14 6	10 0	14 5	10 2	176 3	25 3
11	Guernsey -	4	Mar. 30	834	10 9	8 7	11 14	8 9	13 8	7 3	10 14	8 2	9 12	8 2	10 4	8 11	9 10	7 10	133 3	19 0
12	Cross Sht.-horn	7	Nov. 16	1,146	12 8	9 1	13 6	7 1	14 12	8 1	12 14	8 6	9 10	7 14	11 8	8 0	11 12	7 9	142 6	20 5
			Totals -	13,275	131 1	93 13	129 10	100 15	153 10	97 0	129 5	92 0	117 12	93 2	126 10	91 14	123 7	87 15	1,568 2	—
			[illegible]	[illegible]	[illegible]	[illegible]	10 13	8 7	12 13	8 1	10 12	7 11	9 13	7 12	10 9	7 10	10 5	7 5	130 11	18 11

10746.

Detailed Record of Food consumed, and Milk yielded, by Cows fed on the Unsewaged and Sewaged Meadow Grass, with Oilcake in addition.

Second Season, 1862; 7 days.—September 19 to September 25.

THREE COWS.—UNSEWAGED GRASS.

Food consumed (tons. cwts. qrs. lbs.)

—	Friday.	Saturday.	Sunday.	Monday.	Tuesday.	Wednesday.	Thursday.	Total in 7 days.	Per head per day.
Grass: From which Field, Plot, and Crop.	*	Ten-acre, Plot 0,† Crop 2.	Ten-acre, Plot 0,† Crop 2.	Ten-acre, Plot 0,† Crop 2.	—	*	Ten-acre, Plot 0,† Crop 2.	—	—
Grass: Quantities weighed	0 5 1 24	0 3 1 7	0 3 3 10	0 3 3 11	—	0 3 0 17	0 5 1 4	1 4 3 17	0 1 0 21
Oilcake (equal parts linseed and rape cake)	0 0 0 12	0 0 0 12	0 0 0 12	0 0 0 12	0 0 0 12	0 0 0 12	0 0 0 12	0 0 3 0	0 0 0 4

Yield of Milk, &c. (lbs. ozs.)

Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (Sept. 18). lbs.	Friday A.M.	Friday P.M.	Saturday A.M.	Saturday P.M.	Sunday A.M.	Sunday P.M.	Monday A.M.	Monday P.M.	Tuesday A.M.	Tuesday P.M.	Wednesday A.M.	Wednesday P.M.	Thursday A.M.	Thursday P.M.	Total in 7 days.	Per head per day.
1	Cross Sht.-horn	6	Mar. 20	1,066	13 8	10 0	13 14	10 4	15 14	10 11	14 1	8 1	13 3	9 6	13 12	10 14	15 0	10 1	168 9	24 1
2	Cross Sht.-horn	7	Dec. 25	1,190	6 4	4 1	6 2	6 1	5 8	5 10	5 6	5 12	5 0	5 7	5 10	6 15	6 0	5 1	78 13	11 4
3	Cross Sht.-horn	Aged	Feb. 26	1,020	14 6	10 0	14 12	10 0	15 0	12 0	12 2	10 8	12 1	9 7	16 10	10 1	15 4	10 3	172 .6	24 10
	Totals			3,276	34 2	24 1	34 12	26 5	36 6	28 5	31 9	24 5	30 4	24 4	36 0	27 14	36 4	25 5	419 12	—
	Means			1,092	11 6	8 0	11 9	8 13	12 2	9 7	10 9	8 2	10 1	8 1	12 0	9 5	12 1	8 7	139 15	20 0

TWELVE COWS.—SEWAGED GRASS.

Food consumed (tons. cwts. qrs. lbs.)

—	Friday.	Saturday.	Sunday.	Monday.	Tuesday.	Wednesday.	Thursday.	Total in 7 days.	Per head per day.
Grass: From which Field, Plot, and Crop.	Ten-acre, Plot 3, Crop 3.	Ten-acre, Plots 00† and 3, Crop 3.	*	*	Five-acre, Plot 3, Crop 3.	Five-acre, Plot 3, Crop 3.	Five-acre, Plot 3, Crop 3.	—	—
Grass: Quantities weighed	0 15 1 7	0 19 2 16	0 8 3 8	0 8 3 8	0 15 1 9	0 17 0 14	0 16 2 20	5 1 2 26	0 1 0 24
Oilcake (equal parts linseed and rape cake)	0 0 1 20	0 0 1 20	0 0 1 20	0 0 1 20	0 0 1 20	0 0 1 20	0 0 1 20	0 3 0 0	0 0 0 4

Yield of Milk, &c. (lbs. ozs.)

Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (Sept. 18). lbs.	Friday A.M.	Friday P.M.	Saturday A.M.	Saturday P.M.	Sunday A.M.	Sunday P.M.	Monday A.M.	Monday P.M.	Tuesday A.M.	Tuesday P.M.	Wednesday A.M.	Wednesday P.M.	Thursday A.M.	Thursday P.M.	Total in 7 days.	Per head per day.
1	Cross Sht.-horn	6	Nov. 18	1,270	11 1	8 2	10 8	7 7	10 0	8 7	10 14	7 3	10 11	7 13	10 14	8 2	10 5	7 10	129 1	18 7
2	Cross Sht.-horn	8	Feb. 2	1,267	6 7	5 6	7 2	5 1	6 8	6 4	7 4	5 8	7 6	5 1	7 6	5 4	7 0	5 8	87 1	12 7
3	Cross Sht.-horn	6	Dec. 1	1,288	7 13	5 7	7 7	5 2	7 3	5 11	7 10	5 3	7 1	5 10	7 9	5 12	6 8	5 6	89 6	12 12
4	Cross Sht.-horn	Aged	Jan. 26	973	8 7	6 2	8 4	5 9	8 1	5 0	9 8	5 8	8 11	5 8	8 0	5 8	8 0	5 11	97 13	14 0
5	Cross Sht.-horn	6	Nov. 17	1,199	7 4	5 0	6 0	4 10	6 2	5 4	6 7	5 0	6 3	4 14	6 6	5 2	6 11	5 3	80 2	11 7
6	Cross Sht.-horn	Aged	Jan. 13	1,150	11 12	7 8	11 6	7 0	10 12	8 8	10 9	7 3	10 12	7 12	13 6	8 0	11 7	9 0	134 15	19 4
7	Cross Sht.-horn	6	May 2	1,106	14 4	11 7	14 15	10 9	15 2	10 15	14 10	9 5	14 4	11 6	16 1	10 3	15 4	11 0	179 5	25 10
8	Cross Ayrshire	3	Apr. 13	850	10 4	7 7	10 8	7 3	11 1	7 7	11 10	6 4	10 1	7 10	11 11	7 8	11 2	7 6	127 2	18 3
9	Cross Sht.-horn	Aged	Feb. 16	1,232	8 8	9 0	9 6	7 1	9 1	8 1	10 4	8 13	10 8	7 6	10 8	7 9	11 10	6 7	124 2	17 12
10	Ayrshire	6	Apr. 3	960	14 0	9 9	12 8	10 1	13 8	9 11	14 8	9 0	13 4	9 7	13 4	9 4	15 0	9 10	162 10	23 4
11	Guernsey	4	Mar. 30	834	10 2	7 11	11 0	7 2	11 0	8 1	10 8	7 0	11 4	7 8	11 10	8 2	12 4	7 12	131 0	18 11
12	Cross Sht.-horn	7	Nov. 16	1,146	12 8	8 3	12 10	8 4	10 8	5 6	10 3	7 6	10 0	6 12	10 11	8 3	10 3	6 8	127 5	18 3
	Total			13,275	122 6	90 14	121 10	85 1	118 14	88 11	123 15	83 5	120 1	86 11	127 6	88 9	125 6	87 1	1,469 14	—
	Means			1,106	10 3	7 9	10 2	7 2	9 15	7 6	10 5	6 15	10 0	7 4	10 10	7 6	10 7	7 4	122 8	17 8

* Not experimental.

† Unmeasured land; designated Plot 0 when unsewaged, and Plot 00 when sewaged.

Table IX.—*continued.*

Detailed Record of Food consumed, and Milk yielded, by Cows fed on the Unsewaged and Sewaged Meadow Grass, with Oilcake in addition.

Second Season, 1862; 7 days.—September 26 to October 2.

Three Cows.—Unsewaged Grass.

	Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (Sept. 18). *lbs.*	Friday. A.M.	Friday. P.M.	Saturday. A.M.	Saturday. P.M.	Sunday. A.M.	Sunday. P.M.	Monday. A.M.	Monday. P.M.	Tuesday. A.M.	Tuesday. P.M.	Wednesday. A.M.	Wednesday. P.M.	Thursday. A.M.	Thursday. P.M.	Total in 7 days.	Per head per day.
Food consumed.		Grass — From which Field, Plot, and Crop.				..		Ten-acre, Plot 0*, Crop 2.		Ten-acre, Plot 0*, Crop 2.		Ten-acre, Plot 0*, Crop 2.		Ten-acre, Plot 0*, Crop 3.		Ten-acre, Plot 0*, Crop 3.		Ten-acre, Plot 0*, Crop 3.		—	—
						tons. cwts. qrs. lbs.		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*
		Grass — Quantities weighed				—		0 3 1 12		0 4 0 19		0 4 0 19		0 3 1 10		0 3 0 22		0 3 1 12		1 1 2 10	0 1 0 3
		Oilcake (3 parts linseed and 2 parts rape cake)				0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 3 21	0 0 0 5
Yield of Milk, &c.						*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*
	1	Cross Sht.-horn	6	Mar. 20	1,066	14 0	9 8	14 0	9 4	14 3	8 3	12 4	10 6	14 0	9 12	14 8	9 10	14 0	9 3	162 13	23 4
	2	Cross Sht.-horn	7	Dec. 25	1,190	5 6	5 8	3 8	5 12	3 10	5 2	2 2	4 2	2 8	3 11	2 6	4 0	2 0	2 0	51 11	7 6
	3	Cross Sht.-horn	Aged	Feb. 26	1,020	14 12	10 14	15 4	10 7	14 7	9 12	12 2	12 2	14 2	10 15	15 6	9 12	16 2	9 7	175 8	25 1
		Totals			3,276	34 2	25 14	32 12	25 7	32 4	23 1	26 8	26 10	30 10	24 6	32 4	23 6	32 2	20 10	390 0	—
		Means			1,092	11 6	8 10	10 15	8 8	10 12	7 11	8 13	8 14	10 3	8 2	10 12	7 13	10 11	6 14	130 0	18 9

Twelve Cows.—Sewaged Grass.

	Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (Sept. 18). *lbs.*	Friday. A.M.	Friday. P.M.	Saturday. A.M.	Saturday. P.M.	Sunday. A.M.	Sunday. P.M.	Monday. A.M.	Monday. P.M.	Tuesday. A.M.	Tuesday. P.M.	Wednesday. A.M.	Wednesday. P.M.	Thursday. A.M.	Thursday. P.M.	Total in 7 days.	Per head per day.
Food consumed.		Grass — From which Field, Plot, and Crop.				Five-acre, Plot 3, Crop 3.		Five-acre, Plot 3, Crop 3.		Five-acre, Plot 3, Crop 3.		Five-acre, Plot 3, Crop 3,		†		Ten-acre, Plot 2, Crop 3.		Ten-acre, Plot 2, Crop 3.		—	—
						tons. cwts. qrs. lbs.		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*
		Grass — Quantities weighed				1 0 2 5		0 17 0 23		0 16 3 7		0 16 3 3		0 15 0 20		0 15 1 25		0 12 2 9		5 14 2 8	0 1 1 13
		Oilcake (3 parts linseed and 2 parts rape cake)				0 0 2 4		0 0 2 4		0 0 2 4		0 0 2 4		0 0 2 4		0 0 2 4		0 0 2 4		0 3 3 0	0 0 0 5
Yield of Milk, &c.						*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*
	1	Cross Sht.-horn	6	Nov. 18	1,270	10 2	7 11	10 14	7 8	11 0	7 6	10 6	7 4	10 12	8 0	10 14	8 0	11 13	7 11	129 5	18 8
	2	Cross Sht.-horn	8	Feb. 2	1,267	6 8	5 10	6 9	5 6	7 1	5 3	7 0	4 12	6 0	4 13	6 13	4 15	6 11	5 0	82 5	11 12
	3	Cross Sht.-horn	6	Dec. 1	1,288	7 9	4 11	7 6	5 6	7 6	5 10	7 2	4 13	7 0	4 14	6 10	4 3	6 0	4 4	82 14	11 13
	4	Cross Sht.-horn	Aged	Jan. 26	973	7 14	6 1	7 11	6 6	7 10	6 12	7 4	5 10	7 4	5 4	8 6	5 14	8 4	5 8	95 12	13 11
	5	Cross Sht.-horn	6	Nov. 17	1,190	6 5	5 2	6 3	4 12	6 12	4 13	6 3	4 10	5 6	4 15	5 6	4 7	5 6	4 8	74 12	10 11
	6	Cross Sht.-horn	Aged	Jan. 13	1,150	11 6	9 2	11 12	8 6	11 10	8 3	10 1	7 10	10 4	7 15	11 0	7 12	10 4	8 6	133 11	19 2
	7	Cross Sht.-horn	6	May 2	1,106	15 2	11 0	15 6	10 4	14 10	10 13	12 10	9 4	13 1	9 12	14 3	10 10	13 12	9 4	169 11	24 4
	8	Cross Ayrshire	3	Apr. 13	850	11 6	8 1	11 14	7 11	12 1	7 0	12 1	6 2	11 0	7 4	11 10	7 15	11 3	6 15	132 3	18 14
	9	Cross Sht.-horn	Aged	Feb. 16	1,232	10 7	7 1	11 12	7 8	11 6	7 4	10 4	7 1	10 8	7 0	10 2	7 12	10 12	6 7	125 4	17 14
	10	Ayrshire	6	Apr. 3	960	14 6	7. 9	15 4	9 14	16 0	9. 2	14 5	8 12	13 0	10 3	14 6	9 4	13 8	9 1	164 10	23 8
	11	Guernsey	4	Mar. 30	834	11 10	8 6	12 4	8 4	12 2	7 7	10 8	7 4	10 12	7 8	11 2	8 3	10 8	8 2	134 0	19 2
	12	Cross Sht.-horn	7	Nov. 16	1,146	10 8	7 1	11 0	7 6	11 8	7 3	10 14	8 14	10 10	8 3	10 5	6 14	10 2	6 15	127 7	18 3
		Totals			13,275	123 3	87 7	127 15	88 11	120 2	86 12	118 10	82 0	115 9	85 11	120 13	85 13	118 3	82 1	1,451 14	—
		Means			1,106	10 4	7 5	10 11	7 6	10 12	7 4	9 14	6 13	9 10	7 2	10 1	7 3	9 14	6 13	121 0	17 5

…aged and Sewaged Meadow Grass, with Oilcake in addition.

Second Season, 1862; 7 days.—October 3 to October 9.

Three Cows.—Unsewaged Grass.

					Friday.		Saturday.		Sunday.		Monday.		Tuesday.		Wednesday.		Thursday.		Total in 7 days.	Per head per day.
Food consumed. Grass	From which Field, Plot, and Crop.				Ten-acre, Plot 0,* Crop 3.		Ten-acre, Plot 0,* Crop 2.		Ten-acre, Plot 0,* Crop 2.		Ten-acre, Plot 0,* Crop 2.		†		†		†		—	—
					tons. cwts. qrs. lbs.		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*
Food consumed. Grass	Quantities weighed				0 2 1 9		0 1 3 15		0 1 2 24		0 1 2 24		0 3 3 22		0 3 3 17		0 2 3 6		0 18 1 5	0 0 3 14
Oilcake (3 parts linseed and 2 parts rape cake)					0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 3 21	0 0 0 5
Yield of Milk, &c. Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (Sept. 18). *lbs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*
1	Cross Sht.-horn	6	Mar. 20	1,066	14 2	9 11	13 8	9 13	13 2	9 6	14 10	9 5	13 2	10 0	13 8	9 14	13 3	9 4	162 8	23 3
2	Cross Sht.-horn	7	Dec. 25	1,190	3 4	3 6	3 6	2 7	2 12	2 5	1 12	3 15	1 10	3 8	1 12	2 8	2 4	2 0	36 13	5 4
3	Cross Sht.-horn	Aged	Feb. 26	1,020	14 8	9 15	15 2	10 4	10 6	10 7	13 8	9 7	14 12	11 2	14 4	10 11	13 4	9 15	167 9	23 15
	Totals -			3,276	31 14	23 0	32 0	22 8	26 4	22 2	29 14	22 11	29 8	24 10	29 8	23 1	28 11	21 3	366 14	—
	Means -			1,092	10 10	7 11	10 11	7 8	8 12	7 6	9 15	7 9	9 14	8 3	9 13	7 11	9 9	7 1	122 5	17 8

Twelve Cows.—Sewaged Grass.

					Friday.		Saturday.		Sunday.		Monday.		Tuesday.		Wednesday.		Thursday.		Total in 7 days.	Per head per day.
Food consumed. Grass	From which Field, Plot, and Crop.				Ten-acre, Plot 2, Crop 3.		Ten-acre, Plot 2, Crop 3.		Ten-acre, Plot 2, Crop 3 & Plot 4, Crop 4.		Ten-acre, Plot 2, Crop 3 & Plot 4, Crop 4.		†		†		†		—	—
					tons. cwts. qrs. lbs.		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*		*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*
Food consumed. Grass	Quantities weighed				0 14 2 5		0 13 2 27		0 13 3 0		0 13 3 1		0 19 0 21		0 16 2 25		0 13 3 7		5 5 2 2	0 1 1 1
Oilcake (3 parts linseed and 2 parts rape cake)					0 0 2 4		0 0 2 4		0 0 2 4		0 0 2 4		0 0 2 4		0 0 2 4		0 0 2 4		0 3 3 0	0 0 0 5
Yield of Milk, &c. Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (Sept. 18). *lbs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*
1	Cross Sht.-horn	6	Nov. 18	1,270	10 10	8 0	11 2	7 6	11 0	7 0	10 11	6 4	10 7	7 2	10 11	7 8	10 13	7 0	125 10	17 15
2	Cross Sht.-horn	8	Feb. 2	1,267	6 9	5 0	5 12	5 6	8 1	4 15	6 10	5 2	6 2	5 3	7 1	5 4	7 3	5 0	84 4	12 1
‡3	Cross Sht.-horn	6	Dec. 1	1,288	6 1	4 6	6 0	3 12	5 2	3 7	4 0	2 7	3 1	..	..	1 12	2 6	1 15	44 5	6 5
4	Cross Sht.-horn	Aged	Jan. 26	973	7 5	6 4	7 14	6 2	8 6	6 0	7 6	5 2	7 9	5 4	7 3	4 8	7 0	4 10	90 9	12 15
5	Cross Sht.-horn	6	Nov. 17	1,199	5 11	5 3	5 10	4 10	6 4	4 8	6 0	4 7	6 2	4 9	5 11	4 8	5 7	4 3	72 13	10 6
6	Cross Sht.-horn	Aged	Jan. 13	1,150	10 11	8 0	11 1	7 10	11 8	7 3	10 11	7 14	10 12	8 5	10 13	8 4	10 11	7 10	131 1	18 12
7	Cross Sht.-horn	6	May 2	1,106	14 0	10 12	10 0	13 8	11 2	9 0	14 10	9 9	13 8	10 7	13 11	10 2	13 9	8 9	162 7	23 3
8	Cross Ayrshire	3	Apr. 13	850	10 12	7 6	11 8	7 9	11 2	7 8	11 8	6 6	10 12	7 12	11 7	7 1	10 7	6 15	128 1	18 5
9	Cross Sht.-horn	Aged	Feb. 16	1,232	10 0	7 10	10 4	7 2	10 8	6 14	10 11	7 2	9 12	7 9	10 0	6 15	10 4	5 10	120 5	17 3
10	Ayrshire -	6	Apr. 3	960	13 10	9 0	13 13	9 4	14 12	8 11	13 11	8 11	13 12	9 6	14 8	8 10	13 4	8 10	159 10	22 13
11	Guernsey -	4	Mar. 30	834	11 3	7 6	11 2	8 5	12 8	7 8	11 2	7 5	10 9	9 0	10 8	7 6	10 2	7 15	131 15	18 14
12	Cross Sht.-horn	7	Nov. 16	1,146	10 12	7 10	10 14	6 4	10 12	6 8	10 1	6 10	9 14	7 1	10 12	7 14	10 4	7 10	122 14	17 9
	Totals -			13,275	117 4	86 9	116 0	86 14	121 1	79 2	117 1	76 15	112 4	81 10	112 5	79 12	111 6	75 11	1,373 14	—
	Means -			1,106	9 12	7 3	9 11	7 4	10 1	6 9	9 12	6 7	9 6	6 13	9 6	6 10	9 5	6 5	114 8	16 6

* Unmeasured land, designated Plot 0 when unsewaged.

† Not experimental.

‡ This cow calved again Oct. 7, 1862.

Table IX.—*continued.*

Detailed Record of Food consumed, and Milk yielded, by Cows fed on the Unsewaged and Sewaged Meadow Grass, with Oilcake in addition.

Second Season, 1862 ; 7 days.—October 10 to October 16.

THREE COWS.—UNSEWAGED GRASS.

Food consumed.	Friday.	Saturday.	Sunday.	Monday.	Tuesday.	Wednesday.	Thursday.	Total in 7 days.	Per head per day.
Grass — From which Field, Plot, and Crop.	*	*	*	*	Ten-acre, Plot 0†, Crop 2.	—	*	—	—
	tons. cwts. qrs. lbs.	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*
Grass — Quantities weighed	0 4 0 0	0 3 1 10	0 3 0 27	0 3 1 0	0 4 0 20	—	0 4 0 0	1 2 0 1	0 1 0 5
Oilcake (3 parts linseed and 2 parts rape cake)	0 0 0 15	0 0 0 15	0 0 0 15	0 0 0 15	0 0 0 15	0 0 0 15	0 0 0 15	0 0 3 21	0 0 0 5

Yield of Milk, &c. Cows Nos.	Breed.	Years old.	Dates of Calving.	Weights (Oct. 16). *lbs.*	Friday A.M.	Friday P.M.	Saturday A.M.	Saturday P.M.	Sunday A.M.	Sunday P.M.	Monday A.M.	Monday P.M.	Tuesday A.M.	Tuesday P.M.	Wednesday A.M.	Wednesday P.M.	Thursday A.M.	Thursday P.M.	Total in 7 days.	Per head per day.
					lbs. ozs.	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*
1	Cross Sht.-horn	6	Mar. 20	1,058	12 4	9 0	12 1	8 10	12 2	8 4	15 0	8 6	13 12	8 5	13 0	7 14	12 2	8 3	148 15	21 4
2	Cross Sht.-horn	7	Dec. 25	1,219	3 12	2 1	2 6	2 2	2 0	2 9	1 12	1 6	1 14	2 15	1 11	3 8	1 8	2 2	31 10	4 8
3	Cross Sht.-horn	Aged	Feb. 26	1,058	13 8	10 8	13 11	9 4	13 8	11 8	13 0	10 6	13 0	10 1	13 1	8 6	13 11	8 15	162 7	23 3
			Totals -	3,335	29 8	21 9	28 2	20 0	27 10	22 5	29 12	20 2	28 10	21 5	27 12	19 12	27 5	19 4	343 0	—
			Means -	1,112	9 13	7 3	9 6	6 11	9 3	7 7	9 14	6 11	9 9	7 2	9 4	6 9	9 2	6 7	114 5	16 5

TWELVE COWS.—SEWAGED GRASS.

Food consumed.	Friday.	Saturday.	Sunday.	Monday.	Tuesday.	Wednesday.	Thursday.	Total in 7 days.	Per head per day.
Grass — From which Field, Plot, and Crop.	*	Ten-acre, Plot 4, Crop 4.	*	*	Ten-acre, Plot 4, Crop 4.	Ten-acre, Plot 3, Crop 4.	Ten-acre, Plot 3, Crop 4.	—	—
	tons. cwts. qrs. lbs.	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*	*tons. cwts. qrs. lbs.*
Grass — Quantities weighed	0 14 1 0	1 5 1 9	0 15 3 26	0 15 3 26	0 17 0 5	0 12 1 0	0 19 1 0	6 0 0 10	0 1 1 20
Oilcake (3 parts linseed and 2 parts rape cake)	0 0 2 4	0 0 2 4	0 0 2 4	0 0 2 4	0 0 2 4	0 0 2 4	0 0 2 4	0 3 3 0	0 0 0 5

Yield of Milk, &c. Cows Nos.	Breed.	Years old.	Dates of Calving.	Weights (Oct. 16). *lbs.*	Friday A.M.	Friday P.M.	Saturday A.M.	Saturday P.M.	Sunday A.M.	Sunday P.M.	Monday A.M.	Monday P.M.	Tuesday A.M.	Tuesday P.M.	Wednesday A.M.	Wednesday P.M.	Thursday A.M.	Thursday P.M.	Total in 7 days.	Per head per day.
					lbs. ozs.	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*
1	Cross Sht.-horn	6	Nov. 18	1,288	10 4	7 15	10 11	8 2	10 7	6 12	10 4	7 7	11 6	7 14	11 1	7 3	10 15	7 5	127 10	18 4
2	Cross Sht.-horn	8	Feb. 2	1,270	6 8	5 3	6 10	4 12	6 11	5 0	6 2	4 14	5 14	5 0	5 12	5 1	5 13	4 7	77 11	11 2
‡3	Cross Sht.-horn	6	Dec. 1	1,223	3 14	3 8	4 14	3 0	5 0	4 4	5 14	3 9	6 14	3 9	7 1	4 0	7 0	4 7	66 14	9 9
4	Cross Sht.-horn	Aged	Jan. 26	936	6 9	5 3	6 11	5 2	6 5	4 10	6 3	4 14	6 0	4 12	5 14	3 12	5 12	4 8	76 3	10 14
5	Cross Sht.-horn	6	Nov. 17	1,214	5 0	4 11	5 2	4 8	5 3	4 12	5 11	4 1	5 2	4 8	5 3	4 4	4 11	4 4	67 0	9 9
6	Cross Sht.-horn	Aged	Jan. 13	1,169	10 0	8 6	10 1	8 15	10 4	7 14	10 4	7 10	10 9	7 12	10 14	7 3	10 10	7 3	127 9	18 4
7	Cross Sht.-horn	6	May 2	1,101	13 1	9 14	14 11	10 9	13 12	10 12	13 8	9 12	12 8	10 4	13 0	9 5	12 6	9 8	162 14	23 4
8	Cross Ayrshire	3	Apr. 13	868	10 12	7 5	10 3	8 4	11 2	7 8	12 4	6 9	10 2	7 9	11 8	7 0	11 0	7 10	128 12	18 6
9	Cross Sht.-horn	Aged	Feb. 16	1,224	7 4	7 4	10 6	5 11	10 4	7 8	10 0	6 15	10 6	7 4	10 9	6 14	10 8	7 12	118 9	16 15
10	Ayrshire -	6	Apr. 3	975	13 0	9 6	13 0	9 9	12 8	8 12	14 2	7 13	12 6	9 2	13 6	8 7	12 0	8 9	152 0	21 11
11	Guernsey -	4	Mar. 30	830	11 0	7 15	11 0	8 0	11 0	7 4	11 6	6 8	10 2	8 2	11 2	7 13	10 14	7 13	129 15	18 9
12	Cross Sht.-horn	7	Nov. 16	1,098	10 14	8 15	10 12	7 11	11 1	7 8	11 4	7 10	11 7	7 12	11 4	7 10	11 0	8 14	133 10	19 1
			Totals -	13,196	108 2	85 9	114 1	84 3	113 9	82 8	116 14	77 10	112 12	83 8	116 10	78 8	112 9	82 4	1,368 11	—
					[illegible]	[illegible]	[illegible]	7 0	9 7	6 14	9 12	6 7	9 6	7 0	9 12	6 9	9 6	6 14	114 1	16 5

TABLE X.

Detailed Record of Food consumed, and Milk yielded, by Cows fed on Unsewaged and Sewaged Meadow Grass, and on Italian Rye Grass (without Oilcake).
Third Season, 1863; 7 days.—April 28 to May 4.

					Tuesday.		Wednesday.		Thursday.		Friday.		Saturday.		Sunday.		Monday.		Total in 7 days.	Per head per day.
FIVE COWS.*—UNSEWAGED MEADOW GRASS.																				
Grass consumed.	From which Field, Plot, and Crop				Rye, Plot 2, Crop 1.		Rye, Plot 1, Crop 1.		Rye, Plot 1, Crop 1.		Rye, Plot 1, Crop 1.		Rye, Plot 1, Crop 1.		Rye, Plot 1, Crop 1.		Rye, Plot 1, Crop 1.		—	—
	Quantities weighed (*tons. cwts. qrs. lbs.*)				0 3 0 0		0 5 2 0		0 7 0 0		0 7 2 0		0 6 0 0		0 3 0 8		0 3 0 7		1 15 0 15	0 1 0 0
Yield of Milk, &c. Cows Nos.	Breed.	Years old.	Dates of Calving.	Weights (April 27) *lbs.*	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	—	—
					lbs. ozs.	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*
1	Cross short-horn	Aged	Mar. 1	1,042	17 0	12 8	18 10	11 9	16 2	14 4	18 2	11 8	15 8	13 6	17 9	10 0	19 4	12 6	207 12	29 11
2	Cross short-horn	6	Feb. 15	1,117	20 5	15 8	18 4	16 3	19 0	12 12	18 0	15 4	16 11	15 8	17 8	16 3	20 8	14 4	235 14	33 11
3	Cross short-horn	3	April 13	746	17 10	12 14	16 4	10 12	13 10	15 1	16 6	11 5	16 12	12 2	18 2	12 1	18 8	9 3	200 10	28 10
4	Cross short-horn	7	Feb. 17	1,089	18 6	13 8	17 8	12 1	15 4	14 12	15 1	11 10	13 11	11 14	8 11	6 0	11 10	8 0	178 0	25 7
5	Cross short-horn	7	April 17	1,058	16 6	13 14	16 0	17 4	17 1	17 3	19 0	11 14	18 6	12 11	20 2	15 0	19 8	15 11	230 0	32 14
			Totals	5,052	89 11	68 4	86 10	67 13	81 1	74 0	86 9	61 9	81 0	65 9	82 0	59 4	89 6	59 8	1,052 4	—
			Means	1,010	17 15	13 10	17 5	13 9	16 4	14 13	17 5	12 5	16 3	13 2	16 6	11 14	17 14	11 14	210 7	30 1
TEN COWS.—SEWAGED MEADOW GRASS.																				
Grass consumed.	From which Field, Plot, and Crop				Five-acre, Plot 4, Crop 1.		Five-acre, Plot 4, Crop 1.		—		Ten-acre, Plot 4, Crop 1.		Five-acre, Plot 4, Crop 1.		Five-acre, Plot 4, Crop 1.		Five-acre, Plot 4, Crop 1.		—	—
	Quantities weighed (*tons. cwts. qrs. lbs.*)				0 17 1 23		0 17 1 17		—		0 6 3 23		0 12 1 23		0 8 0 3		0 8 0 3		3 10 1 8	0 1 0 1
1	Cross short-horn	Aged	Mar. 10	1,064	20 6	14 13	18 12	15 13	16 12	15 12	16 8	15 8	17 1	15 12	18 8	18 0	18 4	13 5	235 2	33 9
2	Cross short-horn	Aged	April 7	1,036	21 12	18 10	22 1	14 12	21 4	14 4	21 6	13 4	20 10	16 8	25 6	15 10	23 2	14 10	263 3	37 10
3	Cross short-horn	6	Feb. 20	1,030	17 11	14 9	18 0	13 14	16 6	12 11	15 12	13 2	16 2	14 3	17 0	13 7	18 1	13 9	214 7	30 10
4	Cross short-horn	7	Feb. 15	1,036	17 12	12 11	15 10	12 10	14 0	12 10	14 14	11 4	14 0	12 0	16 2	12 2	17 6	12 2	195 3	27 14
5	Ayrshire – –	8	Feb. 22	1,002	16 8	13 12	16 3	10 12	14 10	9 11	15 6	10 11	14 4	11 0	13 0	13 8	15 4	11 0	185 9	26 8
6	Cross short-horn	6	April 14	880	19 10	10 8	18 6	11 10	20 1	12 2	15 8	14 0	17 6	10 10	18 14	13 0	18 6	12 4	212 5	30 5
7	Mongrel – –	Aged	April 12	808	19 0	10 12	18 0	12 1	15 0	9 5	15 2	9 9	15 11	10 8	17 8	11 4	17 4	11 0	192 0	27 7
8	Cross short-horn	6	April 16	960	11 6	11 1	12 3	9 11	10 4	10 1	13 6	11 0	12 4	10 14	12 0	11 1	11 10	12 6	159 3	22 12
9	Cross short-horn	7	April 13	906	18 0	11 12	19 2	13 2	17 2	13 8	16 7	12 0	18 1	14 7	21 10	14 7	21 8	14 8	225 10	32 4
10	Half short-horn	Aged	Oct. 30	1,320	15 3	12 12	12 11	9 3	12 9	8 8	13 0	11 1	12 0	7 13	13 0	12 2	14 1	11 0	164 15	23 9
			Totals	10,042	177 4	131 4	171 0	123 8	158 0	118 8	157 5	121 7	157 7	123 11	173 0	134 9	174 14	125 12	2,047 9	—
			Means	1,004	17 11	13 2	17 1	12 6	15 13	11 14	15 12	12 2	15 12	12 6	17 5	13 7	17 8	12 9	204 12	29 4
FIVE COWS.—UNSEWAGED OR SEWAGED ITALIAN RYE GRASS.																				
Grass consumed.	From which Field, Plot, and Crop				Rye, Plot 2, Crop 1.		Rye, Plot 1, Crop 1.		Rye, Plot 1, Crop 1.		Rye, Plot 1, Crop 1.		Rye, Plot 1, Crop 1.†		Rye, Plot 1, Crop 1.		Rye, Plot 1, Crop 1.		—	—
	Quantities weighed (*tons. cwts. qrs. lbs.*)				0 3 0 0		0 6 1 0		0 6 3 7		0 7 2 20		0 5 1 0		0 3 0 6		0 3 0 6		1 15 0 11	0 1 0 0
1	Cross short-horn	Aged	April 20	1,066	25 6	15 3	25 1	17 0	24 4	20 10	23 8	16 9	21 13	18 4	20 8	15 11	27 9	15 0	286 6	40 15
2	Ayrshire – –	6	Mar. 15	874	22 8	17 2	22 10	16 14	22 3	16 1	21 12	14 1	21 8	14 5	21 0	13 6	23 2	15 8	262 0	37 7
3†	Cross short-horn	Aged	May 1	1,020	15 10	9 3	27 6	16 8	27 4	20 14	22 10	19 14	..	..	..	..	..	..	159 5	39 13
4	Cross short-horn	Aged	April 15	1,185	24 6	17 14	21 2	19 9	22 10	19 8	22 4	15 14	23 1	14 12	27 0	13 8	25 10	13 12	280 14	40 2
5	Half short-horn	4	Feb. 8	1,114	15 9	15 13	20 4	12 0	19 0	11 9	18 12	11 2	18 0	10 10	17 12	10 2	18 8	11 0	210 1	30 0
			Totals	5,259	103 7	75 3	116 7	81 15	115 5	88 10	108 14	77 8	84 6	57 15	86 4	52 11	94 13	55 4	1,039 5	—
			Means	1,052	20 11	15 1	23 5	16 6	23 1	17 12	21 12	15 8	21 2	14 8	21 9	13 3	23 11	13 13	259 13	37 11

* Rye grass was given to these cows until the unsewaged meadow grass was ready for cutting.
† The No. 3 cow on rye grass, first put up, and whose milk is entered for the first four days, died on May 2, and was replaced on May 5 by the one whose description and weight are given in the Table.

Table X.—*continued.*

Detailed Record of Food consumed, and Milk yielded, by Cows fed on Unsewaged and Sewaged Meadow Grass, and on Italian Rye Grass (without Oilcake). Third Season, 1863 ; 7 days.—May 5 to May 11.

Five Cows.*—Unsewaged Meadow Grass.

					Tuesday.		Wednesday.		Thursday.		Friday.		Saturday.		Sunday.		Monday.		Total in 7 days.	Per head per day.
Grass consumed.	From which Field, Plot, and Crop				Rye, Plot 1, Crop 1.		Rye, Plot 0†, Crop 1.		Rye, Plot 0†, Crop 1.		Rye, Plot 0†, Crop 1.		Rye, Plot 0†, Crop 1.		Rye, Plot 0†, Crop 1.		Rye, Plot 0†, Crop 1.		—	—
	Quantities weighed (*tons. cwts. qrs. lbs.*)				0 6 2 2		0 9 0 16		0 4 0 0		0 5 2 20		0 6 1 16		0 3 2 7		0 3 2 6		1 18 3 11	0 1 0 12
Yield of Milk, &c. Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (Apr. 27). *lbs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	— *lbs. ozs.*	— *lbs. ozs.*
1	Cross short-horn	Aged	Mar. 1	1,042	18 4	11 15	17 6	10 4	17 4	10 0	17 13	10 0	18 8	10 4	18 14	10 11	17 12	11 4	200 3	28 10
2	Cross short-horn	6	Feb. 15	1,117	20 4	12 8	18 2	13 8	18 8	11 8	20 1	12 4	19 1	12 3	18 6	12 15	19 6	13 4	221 14	31 11
3	Cross short-horn	3	April 13	746	17 12	11 10	17 12	10 8	17 4	11 9	16 10	11 1	17 0	10 10	15 6	9 12	15 14	10 0	192 12	27 8
4	Cross short-horn	7	Feb. 17	1,089	9 8	9 0	11 1	9 10	10 10	9 7	10 0	5 15	12 4	8 11	12 0	3 15	12 10	10 1	134 12	19 4
5	Cross short-horn	7	April 17	1,058	16 4	13 5	20 2	12 11	21 0	13 4	20 8	11 13	20 11	13 0	21 4	13 4	21 6	12 14	231 6	33 1
			Totals	5,052	82 0	58 6	84 7	56 9	84 10	55 12	85 0	51 1	87 8	54 12	85 14	50 9	87 0	57 7	960 15	—
			Means	1,010	16 6	11 11	16 14	11 5	16 15	11 2	17 0	10 4	17 8	10 15	17 3	10 2	17 6	11 8	193 3	28 0

Ten Cows.—Sewaged Meadow Grass.

					Tuesday.		Wednesday.		Thursday.		Friday.		Saturday.		Sunday.		Monday.		Total in 7 days.	Per head per day.
Grass consumed.	From which Field, Plot, and Crop				Five-acre, Plot 4, Crop 1.		Five-acre, Plot 4, Crop 1.		Five-acre, Plot 4, Crop 1.		—		Ten-acre, Plot 4. Crop 1.		Five-acre, Plot 4, Crop 1.		Five-acre, Plot 4, Crop 1.		—	—
	Quantities weighed (*tons. cwts. qrs. lbs.*)				0 15 1 19		0 12 0 6		0 13 2 22		—		0 17 0 10		0 9 0 17		0 9 0 16		3 16 2 6	0 1 0 10
1	Cross short-horn	Aged	Mar. 10	1,064	18 0	15 1	20 10	16 1	19 6	14 3	21 4	15 6	19 8	15 14	20 0	15 8	19 4	13 1	243 2	34 12
2	Cross short-horn	Aged	April 7	1,036	24 2	17 0	25 2	16 8	25 4	18 0	25 8	18 3	26 12	18 7	28 7	18 3	26 3	17 2	304 13	43 9
3	Cross short horn	6	Feb. 20	1,030	17 4	13 11	16 8	11 10	16 6	14 9	17 3	13 4	18 10	13 9	18 0	14 1	20 8	12 13	218 0	31 2
4	Cross short-horn	7	Feb. 15	1,036	17 9	13 8	18 0	12 8	16 14	13 0	17 14	12 10	17 0	12 4	17 2	13 12	16 12	12 0	210 13	30 2
5	Ayrshire – –	3	Feb. 22	1,002	15 6	12 1	17 4	12 0	16 11	11 8	17 4	10 10	16 9	11 6	17 10	11 9	16 10	10 6	196 14	28 2
6	Cross short-horn	6	April 14	880	18 3	14 7	20 12	14 2	20 9	14 6	19 2	13 11	18 11	13 15	21 6	14 0	19 13	18 8	236 14	33 13
7	Mongrel – –	Aged	April 12	808	16 0	11 6	17 2	11 2	15 3	10 13	14 12	10 4	16 6	11 1	16 6	12 0	14 0	10 10	187 1	26 11
8	Cross short-horn	6	April 16	960	13 1	6 8	9 2	7 1	14 1	11 6	17 0	12 14	16 7	11 2	16 1	10 12	17 3	11 2	173 12	24 13
9	Cross short-horn	7	April 13	996	19 12	16 0	21 15	14 1	20 1	14 2	20 4	13 10	20 10	14 5	20 2	15 11	20 0	14 11	245 4	35 1
10	Half short horn	Aged	Oct. 30	1,320	12 6	9 12	13 2	10 5	13 2	10 1	13 2	10 14	12 0	10 11	13 0	10 6	13 10	9 11	162 2	23 3
			Totals	10,042	172 0	129 6	179 9	125 6	177 9	132 0	183 5	131 6	182 9	132 10	183 2	135 14	183 15	125 0	2,178 11	—
			Means	1,004	17 3	12 15	18 0	12 9	17 12	13 3	18 5	13 2	18 4	13 4	18 13	13 10	18 6	12 8	217 14	31 2

Five Cows.—Unsewaged or Sewaged Italian Rye Grass.

					Tuesday.		Wednesday.		Thursday.		Friday.		Saturday.		Sunday.		Monday.		Total in 7 days.	Per head per day.
Grass consumed.	From which Field, Plot, and Crop				Rye, Plot 1, Crop 1.		Rye, Plot 0†, Crop 1.		Rye, Plot 0†, Crop 1.		Rye, Plot 0†, Crop 1.		Rye, Plot 0†, Crop 1.		Rye, Plot 0†, Crop 1.		Rye, Plot 0†, Crop 1.		—	—
	Quantities weighed (*tons. cwts. qrs. lbs.*)				0 7 3 13		0 9 2 0		0 4 1 6		0 6 1 9		0 6 0 10		0 3 1 27		0 3 1 26		2 1 0 7	0 1 0 19
1	Cross short-horn	Aged	April 20	1,066	26 6	17 10	26 0	15 2	23 14	18 1	25 2	15 0	27 4	18 8	27 3	16 7	24 10	29 8	301 11	43 2
2	Ayrshire – –	6	Mar. 15	874	23 2	16 1	23 0	14 5	22 3	14 0	26 6	14 15	21 3	14 7	21 8	14 1	20 14	14 0	260 1	37 2
3	Cross short-horn	Aged	May 1	1,020	27 2	16 9	25 8	19 5	26 10	18 1	22 13	15 9	25 0	17 5	25 4	15 5	24 0	16 1	294 8	42 1
4	Cross short-horn	Aged	April 15	1,185	25 3	16 14	26 0	17 1	25 10	16 14	24 10	15 7	24 8	16 3	26 0	14 11	20 4	14 0	283 5	40 8
5	Half short-horn	4	Feb. 8	1,114	15 6	7 3	12 2	6 11	13 11	9 12	15 6	9 3	7 0	2 4	6 4	5 2	4 0	2 0	116 0	16 9
			Totals	5,259	117 3	74 5	112 10	72 8	112 0	76 12	114 5	70 2	104 15	68 11	105 3	65 10	93 12	66 9	1,255 9	—
			Means	1,052	23 7	14 14	22 8	14 8	22 6	15 6	22 14	14 0	21 0	13 12	21 4	13 2	18 12	13 5	251 2	35 14

* Rye grass was given to these cows until the unsewaged meadow grass was ready for cutting.

† Unmeasured land, designated Plot 0 when unsewaged.

…consumed, and Milk yielded, by Cows fed on Unsewaged and Sewaged Meadow Grass, and on Italian Rye Grass (without Oilcake).
Third Season, 1863 ; 7 days.—May 12 to May 18.

Five Cows.*—Unsewaged Meadow Grass.

	Cows, Nos.	Breed.	Years old.	Dates of Calving.	Weights (April 27) lbs.	Tuesday. A.M.	Tuesday. P.M.	Wednesday. A.M.	Wednesday. P.M.	Thursday. A.M.	Thursday. P.M.	Friday. A.M.	Friday. P.M.	Saturday. A.M.	Saturday. P.M.	Sunday. A.M.	Sunday. P.M.	Monday. A.M.	Monday. P.M.	Total in 7 days.	Per head per day.
Grass consumed.	From which Field, Plot, and Crop					Rye, Plot 0†, Crop 1.		Rye, Plot 0†, Crop 1.		Rye, Plot 0†, Crop 1.		Rye, Plot 0†, Crop 1.		Rye, Plot 0†, Crop 1.		Rye, Plot 0†, Crop 1.		Rye, Plot 0†, Crop 1.		—	—
	Quantities weighed (tons. cwts. qrs. lbs.)					0 7 0 0		0 6 3 8		0 5 2 0		.0 8 1 0		0 6 2 0		0 3 2 11		0 3 2 10		2 1 1 1	0 1 0 20
						lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.
Yield of Milk, &c.	1	Cross short-horn	Aged	Mar. 1	1,042	16 8	11 14	16 12	10 5	17 10	10 8	18 2	11 10	17 4	11 8	17 5	9 6	18 8	9 8	196 12	28 2
	2	Cross short-horn	6	Feb. 15	1,117	20 0	11 15	18 9	12 9	18 2	13 3	17 10	12 6	16 15	11 8	16 8	11 8	18 9	11 0	210 6	30 1
	3	Cross short-horn	3	April 13	746	16 0	10 14	17 8	11 0	17 12	10 15	17 15	11 7	16 10	10 12	17 4	10 12	18 2	9 14	196 13	28 2
	4	Cross short-horn	7	Feb. 17	1,089	10 1	8 5	11 10	7 13	11 10	9 8	12 6	8 12	13 4	9 5	12 11	7 6	13 11	7 4	143 10	20 8
	5	Cross short-horn	7	April 17	1,058	20 0	13 5	22 1	13 10	21 8	13 10	22 12	14 6	22 4	13 6	21 0	13 2	22 14	12 6	246 4	35 3
				Totals	5,052	82 9	56 5	86 8	55 5	86 10	57 12	88 13	58 9	86 5	56 7	84 12	52 2	91 12	50 0	993 13	—
				Means	1,010	16 8	11 4	17 5	11 1	17 5	11 9	17 12	11 11	17 4	11 5	16 15	10 7	18 6	10 0	198 12	28 6

Ten Cows.—Sewaged Meadow Grass.

	Cows, Nos.	Breed.	Years old.	Dates of Calving.	Weights (April 27) lbs.	Tuesday. A.M.	Tuesday. P.M.	Wednesday. A.M.	Wednesday. P.M.	Thursday. A.M.	Thursday. P.M.	Friday. A.M.	Friday. P.M.	Saturday. A.M.	Saturday. P.M.	Sunday. A.M.	Sunday. P.M.	Monday. A.M.	Monday. P.M.	Total in 7 days.	Per head per day.
Grass consumed.	From which Field, Plot, and Crop					Five-acre, Plot 3, Crop 1.		Five-acre, Plot 3, Crop 1.		Five-acre, Plot 3, Crop 1.		Ten-acre, Plot 4, Crop 1.		Ten-acre, Plot 4, Crop 1.		Ten-acre, Plot 3, Crop 1.		Ten-acre, Plot 3, Crop 1.		—	—
	Quantities weighed (tons. cwts. qrs. lbs.)					0 19 1 12		0 11 2 19		0 14 2 6		0 16 1 6		0 13 2 14		0 7 1 13		0 7 1 19		4 10 1 5	0 1 1 5
Yield of Milk, &c.	1	Cross short-horn	Aged	Mar. 10	1,064	19 15	15 6	22 4	14 6	20 0	14 7	20 2	15 15	19 8	15 8	19 8	13 8	19 2	13 2	242 11	34 11
	2	Cross short-horn	Aged	April 7	1,036	26 0	17 13	26 10	19 4	27 5	18 4	27 1	18 2	27 1	20 4	27 9	16 0	26 2	16 0	313 7	44 12
	3	Cross short-horn	6	Feb. 20	1,030	18 4	14 10	20 10	14 0	19 2	14 11	17 2	15 6	18 10	13 15	16 10	14 1	19 0	13 4	229 5	32 12
	4	Cross short-horo	7	Feb. 15	1,036	16 4	12 10	17 11	12 5	17 6	12 8	17 12	13 1	17 4	13 8	18 6	11 2	18 11	10 15	209 7	29 15
	5	Ayrshire – –	8	Feb. 22	1,002	15 0	11 2	16 14	10 8	17 9	12 0	16 14	12 3	16 2	12 5	16 8	11 1	17 0	9 6	194 8	27 12
	6	Cross short-horn	6	April 14	880	20 6	13 0	19 8	13 13	18 12	14 5	21 2	13 15	20 12	16 1	21 14	12 12	20 6	12 6	239 0	34 2
	7	Mongrel – –	Aged	April 12	808	16 6	9 15	16 1	11 6	20 2	12 5	18 13	12 5	19 3	12 5	19 6	10 12	17 6	10 1	206 6	29 8
	8	Cross short-horn	6	April 16	960	14 8	11 12	14 0	11 4	13 12	11 12	13 0	13 6	12 8	13 1	13 0	11 14	14 0	10 6	178 3	25 7
	9	Cross short-horn	7	April 13	906	18 0	15 8	20 6	14 1	20 5	13 14	20 12	15 12	20 5	15 3	19 0	14 12	20 9	12 1	240 8	34 6
	10	Half short-horn	Aged	Oct. 30	1,320	13 12	9 11	12 8	9 12	13 1	10 14	13 12	11 2	13 0	10 8	13 4	8 12	14 0	8 9	162 9	23 4
				Totals	10,042	178 7	131 7	186 8	130 11	187 6	135 0	186 6	141 3	184 5	142 10	185 1	124 10	186 4	116 2	2,216 0	—
				Means	1,004	17 14	13 2	18 11	13 1	18 12	13 8	18 10	14 2	18 7	14 4	18 8	12 7	18 10	11 10	221 10	31 11

Five Cows.—Unsewaged or Sewaged Italian Rye Grass.

	Cows, Nos.	Breed.	Years old.	Dates of Calving.	Weights (April 27) lbs.	Tuesday. A.M.	Tuesday. P.M.	Wednesday. A.M.	Wednesday. P.M.	Thursday. A.M.	Thursday. P.M.	Friday. A.M.	Friday. P.M.	Saturday. A.M.	Saturday. P.M.	Sunday. A.M.	Sunday. P.M.	Monday. A.M.	Monday. P.M.	Total in 7 days.	Per head per day.
Grass consumed.	From which Field, Plot, and Crop					Ryo, Plot 0†, Crop 1.		Rye, Plot 0†, Crop 1.		Rye, Plot 0†, Crop 1.		Rye, Plot 0†, Crop 1.		Rye, Plot 0†, Crop 1.		Rye, Plot 0†, Crop 1.		Rye, Plot 0†, Crop 1.		—	—
	Quantities weighed (tons. cwts. qrs. lbs.)					0 7 0 2		0 7 1 0		0 5 2 20		0 8 1 20		0 7 0 0		0 3 0 5		0 3 0 5		2 1 1 24	0 1 0 21
Yield of Milk, &c.	1	Cross short-horn	Aged	April 20	1,066	28 1	17 6	27 2	19 1	28 0	19 8	27 5	21 7	26 12	19 14	26 8	17 8	27 1	16 6	321 15	46 0
	2	Ayrshire – –	6	Mar. 15	874	21 10	15 4	22 5	15 9	22 9	14 9	22 6	15 0	23 3	14 3	21 10	13 12	22 4	13 3	257 7	36 12
	3	Cross short-horn	Aged	May 1	1,020	25 8	15 10	25 6	17 10	25 11	16 8	24 6	17 9	25 4	17 8	25 14	16 14	25 9	16 4	295 9	42 4
	4	Cross short-horn	Aged	April 15	1,185	16 12	10 14	20 0	13 1	20 7	12 4	22 1	13 9	22 0	16 9	22 2	10 7	18 12	11 11	230 9	32 15
	5	Half short-horn	4	Feb. 8	1,114	2 6	2 3	2 9	3 6	3 9	2 9	3 3	2 5	3 0	1 8	3 2	1 10	3 9	1 9	36 8	5 3
				Totals	5,259	94 5	61 5	97 6	68 11	100 4	65 6	99 5	60 14	100 3	69 10	99 4	60 3	97 3	59 1	1,142 0	—
				Means	1,052	18 14	12 4	19 8	13 12	20 1	13 1	19 14	13 15	20 0	13 15	19 13	12 1	19 7	11 13	228 6	32 10

* Rye grass was given to these cows until the unsewaged meadow grass was ready for cutting.

† Unmeasured land, designated Plot 0 when unsewaged

Table X.—*continued.*

Detailed Record of Food consumed, and Milk yielded, by Cows fed on Unsewaged and Sewaged Meadow Grass, and on Italian Rye Grass (without Oilcake). Third Season, 1863; 7 days.—May 19 to May 25.

Five Cows.*—Unsewaged Meadow Grass.

Cows, Nos.	Breed.	Years old.	Dates of Calving.	Weights (May 25) lbs.	Tuesday. A.M.	Tuesday. P.M.	Wednesday. A.M.	Wednesday. P.M.	Thursday. A.M.	Thursday. P.M.	Friday. A.M.	Friday. P.M.	Saturday. A.M.	Saturday. P.M.	Sunday. A.M.	Sunday. P.M.	Monday. A.M.	Monday. P.M.	Total in 7 days.	Per head per day.
Grass consumed. From which Field, Plot, and Crop					Rye, Plot 0†, Crop 1.		Rye, Plot 0†, Crop 1.		Rye, Plot 0†, Crop 1.		Rye, § Crop 1.		Rye, § Crop 1.		Rye, § Crop 1.		Rye, § Crop 1.		——	—
Quantities weighed (*tons. cwts. qrs. lbs.*)					0 6 2 0		0 5 2 0		‡0 5 1 0		0 6 1 0		0 8 0 7		0 3 3 14		0 3 3 14		1 19 1 7	0 1 0 14
Yield of Milk, &c.					*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*
1‖	Cross short-horn	Aged	May 1	1,064	16 1	10 8	17 12	8 15	17 4	10 12	17 5	9 6	15 3	10 6	16 14	9 1	17 8	9 12	186 11	26 11
2	Cross short-horn	6	Feb. 15	1,184	17 9	10 15	15 1	9 13	17 7	11 2	16 11	12 6	17 6	12 5	18 1	10 12	18 4	10 10	198 6	28 5
3	Cross short-horn	3	April 13	818	16 12	10 8	16 15	9 5	16 15	10 11	16 10	10 8	17 9	10 7	18 4	9 13	17 13	10 8	192 10	27 8
4¶	Cross short-horn	8	May 20	1,096	12 11	7 2	11 14	8 8	10 3	8 10	11 7	9 15	10 1	6 13	13 0	5 11	12 12	6 1	134 12	19 4
5	Cross short-horn	7	April 17	1,112	22 7	12 13	22 8	12 9	21 8	14 4	23 7	13 11	24 6	13 8	21 6	12 8	21 2	13 4	249 5	35 10
			Totals	5,274	85 8	51 14	84 2	49 2	83 5	55 7	85 8	55 14	84 9	53 7	87 9	47 13	87 7	50 3	961 12	—
			Means	1,055	17 2	10 6	16 13	9 13	16 10	11 1	17 2	11 3	16 15	10 11	17 8	9 9	17 8	10 1	192 6	27 8

Ten Cows.—Sewaged Meadow Grass.

Cows, Nos.	Breed.	Years old.	Dates of Calving.	Weights (May 25) lbs.	Tuesday. A.M.	Tuesday. P.M.	Wednesday. A.M.	Wednesday. P.M.	Thursday. A.M.	Thursday. P.M.	Friday. A.M.	Friday. P.M.	Saturday. A.M.	Saturday. P.M.	Sunday. A.M.	Sunday. P.M.	Monday. A.M.	Monday. P.M.	Total in 7 days.	Per head per day.
Grass consumed. From which Field, Plot, and Crop					Five-acre, Plot 3, Crop 1.		Five-acre, Plot 3, Crop 1.		Five-acre, Plot 3, Crop 1.		Ten-acre, Plot 3, Crop 1.		Ten-acre, Plot 3, Crop 1.		Ten-acre, Plot 3, Crop 1.		Ten-acre, Plot 3, Crop 1.		—	—
Quantities weighed (*tons. cwts. qrs. lbs.*)					0 16 0 14		0 14 1 4		0 13 2 7		0 14 2 21		0 15 3 7		0 7 3 19		0 7 3·25		4 10 1 13	0 1 1 5
1	Cross short-horn	Aged	Mar. 10	1,136	17 12	14 2	20 4	14 14	18 6	14 3	18 10	13 3	16 10	12 7	19 6	12 10	19 10	13 5	225 6	32 3
2	Cross short-horn	Aged	April 7	1,010	25 5	16 13	27 12	16 14	26 6	17 1	25 6	15 10	24 1	15 7	25 4	14 10	26 4	14 3	291 0	41 9
3	Cross short-horn	6	Feb. 20	1,060	16 5	13 4	16 10	14 14	17 4	13 8	16 1	13 6	15 4	14 11	16 0	11 8	18 0	11 6	208 1	29 11
4	Cross short-horn	7	Feb. 15	990	16 8	11 13	18 3	11 14	17 0	11 10	17 8	11 15	17 2	11 6	16 8	11 0	16 10	11 14	200 15	28 11
5	Ayrshire	8	Feb. 22	984	13 12	9 13	17 0	9 6	15 6	10 9	15 2	10 2	14 6	9 15	15 8	10 0	14 6	9 10	174 15	25 0
6	Cross short-horn	6	April 14	956	19 9	14 8	19 4	13 0	18 12	13 6	20 4	14 15	19 0	13 4	19 0	11 6	20 7	12 14	229 9	32 13
7	Mongrel	Aged	April 12	838	16 14	11 4	18 6	11 4	18 1	12 2	18 7	11 0	16 8	10 14	17 1	10 6	18 8	10 0	200 11	28 11
8	Cross short-horn	6	April 16	1,026	13 6	11 9	13 12	12 0	12 4	10 12	10 9	10 8	11 4	10 10	12 4	10 12	14 12	11 2	165 8	23 10
9	Cross short-horn	7	April 13	954	20 12	13 8	19 14	13 4	20 5	14 8	20 9	12 2	18 9	12 0	18 2	14 12	20 10	12 5	231 4	33 1
10	Half short-horn	Aged	Oct. 30	1,358	12 0	9 5	13 13	9 6	12 0	10 0	12 10	10 2	13 5	9 7	12 6	9 0	12 12	7 14	154 0	22 0
			Totals	10,312	172 3	125 15	184 14	126 12	175 12	127 11	175 2	122 15	166 1	120 1	171 7	116 0	181 15	114 9	2,081 5	—
			Means	1,031	17 4	12 9	18 8	12 11	17 9	12 12	17 8	12 5	16 10	12 0	17 2	11 10	18 3	11 7	208 2	29 12

Five Cows.—Unsewaged or Sewaged Italian Rye Grass.

Cows, Nos.	Breed.	Years old.	Dates of Calving.	Weights (May 25) lbs.	Tuesday. A.M.	Tuesday. P.M.	Wednesday. A.M.	Wednesday. P.M.	Thursday. A.M.	Thursday. P.M.	Friday. A.M.	Friday. P.M.	Saturday. A.M.	Saturday. P.M.	Sunday. A.M.	Sunday. P.M.	Monday. A.M.	Monday. P.M.	Total in 7 days.	Per head per day.
Grass consumed. From which Field, Plot, and Crop					Rye, Plot 0†, Crop 1.		Rye, Plot 0†, Crop 1.		Rye, § Crop 1.		Rye, § Crop 1.		Rye, § Crop 1.		Rye, § Crop 1.		Rye, § Crop 1.		—	—
Quantities weighed (*tons. cwts. qrs. lbs.*)					0 6 2 0		0 6 1 4		0 5 1 0		0 4 1 4		0 8 2 6		0 3 3 4		0 3 3 2		1 18 1 20	0 1 0 11
1	Cross short-horn	Aged	April 20	1,122	26 4	17 10	25 9	18 10	28 2	19 0	28 0	19 12	28 15	19 0	31 4	16 12	29 7	17 15	326 4	46 10
2	Ayrshire	6	Mar. 15	902	21 12	12 11	21 14	13 0	22 0	14 0	22 6	13 15	23 7	14 0	21 8	12 4	21 0	13 0	246 13	35 4
3‖	Cross short-horn	Aged	Mar. 1	1,106	25 12	15 4	24 4	15 14	24 2	17 0	23 7	17 3	25 0	16 10	25 12	14 9	25 12	16 0	286 9	40 15
4	Cross short-horn	Aged	April 15	1,176	20 8	13 15	22 14	14 12	21 14	14 10	20 8	13 10	22 4	14 5	24 8	13 11	25 13	14 10	257 14	36 13
5**	Cross short-horn	6	Jan. 2	1,048	2 6	1 7	2 1	1 0	1 8	0 11	1 0	0 8	0 6	0 5	16 4	10 10	18 4	11 10	68 0	9 11
			Totals	5,354	96 10	60 15	96 10	63 4	97 10	65 5	95 5	65 0	100 0	64 4	119 4	67 14	120 4	73 3	1,185 8	—
			Means	1,071	19 5	12 3	19 5	12 10	19 9	13 1	19 1	13 0	20 0	12 14	23 14	13 9	24 1	14 10	237 2	33 14

* Rye grass was given to these cows until the unsewaged meadow grass was ready for cutting. † Unmeasured land, designated Plot 0 when unsewaged.

‡ Including 3 cwts. 1 qr. not experimental. § Not experimental.

‖ At the date of this weighing, May 25, No. 1 cow on unsewaged meadow grass, and No. 3 cow on rye grass were transposed, and the description and weight entered are, in each case, those of the newly placed cow.

¶ ... on May 25, and diminished considerably in yield of milk; and as she was obviously fattening she was

Detailed Record of Food consumed, and Milk yielded, by Cows fed on Unsewaged and Sewaged Meadow Grass, and on Italian Rye Grass (without Oilcake). Third Season, 1863; 7 days.—May 26 to June 1.

Five Cows.*—Unsewaged Meadow Grass.

					Tuesday.		Wednesday.		Thursday.		Friday.		Saturday.		Sunday.		Monday.		Total in 7 days.	Per head per day.
Grass consumed. From which Field, Plot, and Crop					† Rye, Crop 1.		† Rye, Crop 1.		† Rye, Crop 1.		† Rye, Crop 1.		† Rye, Crop 1.		† Rye, Crop 1.		† Rye, Crop 1.		—	—
Quantities weighed (*tons. cwts. qrs. lbs.*)					0 6 2 6		0 6 0 0		0 3 0 20		0 3 3 0		0 4 2 2		0 5 0 0		0 5 0 0		1 14 0 0	0 0 3 25
Yield of Milk, &c. Cows Nos.	Breed.	Years old.	Dates of Calving.	Weights (May 25). *lbs.*	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	—	—
					lbs. ozs.	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*
1	Cross short-horn	Aged	May 1	1,064	25 1	15 12	25 1	15 4	25 0	15 8	25 2	15 6	24 6	16 0	24 8	16 1	23 1	14 10	280 12	40 2
2	Cross short-horn	6	Feb. 15	1,181	18 5	11 0	16 14	10 13	17 0	10 14	17 3	8 7	14 12	12 8	16 1	11 2	14 4	9 0	188 3	26 14
3	Cross short-horn	3	April 13	818	16 3	11 4	16 14	10 15	17 5	10 0	16 12	10 5	17 2	10 8	16 7	9 12	12 4	8 8	184 3	26 5
4	Cross short-horn	8	May 20	1,096	27 14	12 14	27 14	12 15	23 10	19 9	25 8	16 4	24 6	19 8	25 12	15 8	24 9	16 15	293 2	41 14
5	Cross short-horn	7	April 17	1,112	21 2	14 4	20 14	17 10	22 0	11 15	20 0	12 6	22 3	13 6	21 6	13 8	21 0	12 9	244 3	34 14
			Totals	5,274	108 9	65 2	107 9	67 9	104 15	67 14	104 9	62 12	102 13	71 14	104 2	65 15	95 2	61 10	1,190 7	—
			Means	1,055	21 11	13 1	21 8	13 8	21 0	13 9	20 15	12 9	20 9	14 6	20 13	13 3	19 0	12 5	238 1	34 0

Ten Cows.—Sewaged Meadow Grass.

					Tuesday.		Wednesday.		Thursday.		Friday.		Saturday.		Sunday.		Monday.		Total in 7 days.	Per head per day.
Grass consumed. From which Field, Plot, and Crop					Five-acre, Plots 2 & 3, Crop 1.		Five-acre, Plot 2, Crop 1.		Five-acre, Plot 2, Crop 1.		Five-acre, Plot 2, Crop 1.		Five-acre, Plot 2, Crop 1.		Five-acre, Plot 2, Crop 1.		Five-acre, Plot 2, Crop 1.		—	—
Quantities weighed (*tons. cwts. qrs. lbs.*)					1 2 3 7		0 16 0 0		0 11 1 23		0 10 2 5		0 10 1 12		0 12 1 11		0 12 1 17		4 15 3 19	0 1 1 13
Yield of Milk, &c. Cows Nos.	Breed.	Years old.	Dates of Calving.	Weights (May 25). *lbs.*	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	—	—
1	Cross short-horn	Aged	Mar. 10	1,136	17 6	13 0	20 0	12 2	19 7	13 13	21 1	14 5	18 1	13 0	19 4	13 12	18 2	12 13	226 2	32 5
2	Cross short-horn	Aged	April 7	1,010	23 8	15 5	23 12	14 15	25 12	15 9	25 6	15 12	25 3	14 8	25 4	14 4	20 2	11 15	271 3	38 12
3	Cross short-horn	6	Feb. 20	1,060	17 8	12 1	17 0	12 6	16 6	13 6	17 2	12 7	14 0	11 1	15 8	13 6	16 10	12 0	200 13	28 11
4	Cross short-horn	7	Feb. 15	990	14 9	11 12	16 10	12 7	17 12	12 4	17 12	13 4	17 11	13 6	16 4	12 5	16 14	9 9	202 7	28 15
5	Ayrshire	8	Feb. 22	984	14 6	11 4	15 15	9 11	16 4	11 4	16 14	10 14	14 10	10 11	15 4	10 3	14 4	10 1	181 9	25 15
6	Cross short-horn	6	April 14	956	19 8	12 1	21 2	12 12	21 4	14 9	23 8	14 2	22 1	12 5	20 6	13 7	19 9	11 0	237 10	33 15
7	Mongrel	Aged	April 12	838	17 0	12 5	18 8	11 11	20 5	13 0	20 8	12 15	18 6	10 11	17 5	10 8	14 7	9 3	206 12	29 9
8	Cross short-horn	6	April 16	1,026	11 0	16 3	11 5	15 6	12 3	15 4	11 6	17 1	13 10	18 14	14 0	10 4	15 3	12 2	193 13	27 11
9	Cross short-horn	7	April 13	954	19 1	12 6	21 0	11 11	19 1	12 8	20 4	13 6	18 8	14 13	18 2	15 0	15 3	12 14	223 13	31 15
10	Half short-horn	Aged	Oct. 30	1,358	12 3	8 10	12 8	8 11	12 2	9 10	13 0	8 11	11 10	8 11	13 1	8 8	10 0	4 3	141 8	20 3
			Totals	10,312	166 1	124 15	177 12	121 12	180 8	131 3	186 13	132 13	173 12	128 0	174 6	121 9	160 6	105 12	2,085 10	—
			Means	1,031	16 10	12 8	17 12	12 3	18 1	13 2	18 11	13 4	17 6	12 13	17 7	12 2	16 1	10 9	208 9	29 13

Five Cows.—Unsewaged or Sewaged Italian Rye Grass.

					Tuesday.		Wednesday.		Thursday.		Friday.		Saturday.		Sunday.		Monday.		Total in 7 days.	Per head per day.
Grass consumed. From which Field, Plot, and Crop					† Rye, Crop 1.		† Rye, Crop 1.		Rye, Plot 3, Crop 2.		Rye, Plot 3, Crop 2.		Rye, Plot 3, Crop 2.		Rye, Plot 3, Crop 2.		Rye, Plot 3, Crop 2.		—	—
Quantities weighed (*tons. cwts. qrs. lbs.*)					0 8 1 6		0 7 2 10		0 7 1 15		0 2 3 17		0 7 3 12		0 6 1 23		0 6 2 0		2 6 3 27	0 1 1 10
Yield of Milk, &c. Cows Nos.	Breed.	Years old.	Dates of Calving.	Weights (May 25). *lbs.*	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	—	—
1	Cross short-horn	Aged	April 20	1,122	28 2	18 0	28 8	17 3	29 10	17 9	29 1	17 7	29 2	20 12	29 15	17 13	27 5	16 0	326 7	46 10
2	Ayrshire	6	Mar. 15	902	18 5	13 9	20 11	13 9	22 13	13 11	21 14	13 11	21 10	13 4	21 0	11 2	19 8	11 3	235 14	33 11
3	Cross short-horn	Aged	Mar. 1	1,106	16 8	9 1	17 0	10 3	17 8	10 6	16 14	5 8	18 12	11 7	16 4	10 4	15 6	9 1	184 2	26 5
4	Cross short-horn	Aged	April 15	1,176	24 6	15 13	24 5	16 14	23 14	15 0	24 0	16 1	25 0	16 4	22 8	12 8	21 0	12 14	270 7	38 10
5	Cross short-horn	6	Jan. 2	1,048	19 2	15 10	16 8	10 0	16 8	9 12	16 5	10 4	15 6	12 0	16 6	9 0	15 8	8 6	190 11	27 4
			Totals	5,354	106 7	72 1	107 0	67 15	110 5	66 6	108 2	62 15	109 14	73 11	106 1	60 11	98 11	57 8	1,207 9	—
			Means	1,071	21 5	14 7	21 6	13 9	22 1	13 4	21 10	12 9	22 0	14 12	21 3	12 2	19 12	11 8	241 8	34 8

* Rye grass was given to these cows until the unsewaged meadow grass was ready for cutting.

† Not experimental.

Table X.—*continued.*

Detailed Record of Food consumed, and Milk yielded, by Cows fed on Unsewaged and Sewaged Meadow Grass, and on Italian Rye Grass (without Oilcake). Third Season, 1863; 7 days.—June 2 to June 8.

Five Cows.*—Unsewaged Meadow Grass.

					Tuesday.		Wednesday.		Thursday.		Friday.		Saturday.		Sunday.		Monday.		Total in 7 days.	Per head per day.
Grass consumed.	From which Field, Plot, and Crop				Rye, † Crop 1.		Rye, † Crop 1.		Rye, † Crop 1.		Rye, † Crop 1.		Rye, † Crop 1.		Rye, † Crop 1.		Rye, † Crop 1.		—	—
	Quantities weighed (*tons. cwts. qrs. lbs.*)				0 5 3 14		0 4 2 2		0 9 3 14		0 4 2 0		0 4 0 0		0 5 2 4		0 5 2 4		1 19 3 10	0 1 0 15
Yield of Milk, &c. Cows Nos.	Breed.	Years old.	Dates of Calving.	Weights (May 25) *lbs.*	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	—	—
					lbs. ozs.	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*
1	Cross short-horn	Aged	May 1	1,062‡	24 14	14 9	21 10	14 14	23 11	14 0	20 0	14 4	21 0	14 4	20 10	12 11	21 0	13 0	253 7	36 3
2	Cross short-horn	6	Feb. 15	1,177‡	14 13	10 0	16 0	9 8	15 4	9 0	14 3	10 13	15 1	9 12	16 3	9 5	16 0	9 0	174 14	25 0
3	Cross short-horn	3	April 13	821‡	14 6	9 10	16 15	9 7	15 2	10 0	14 10	9 8	15 2	8 15	14 10	9 0	14 14	9 0	171 3	24 7
4	Cross short-horn	8	May 20	1,094‡	24 12	17 11	25 3	17 12	26 4	18 0	27 4	16 12	27 0	19 1	25 2	18 4	26 [illegible]	16 8	306 5	43 12
5	Cross short-horn	7	April 17	1,110‡	20 0	12 1	20 10	12 8	20 7	12 14	20 0	13 10	20 7	11 12	20 3	11 2	19 12	12 6	227 12	32 9
			Totals	5,254	98 13	63 15	103 6	64 1	100 12	63 14	96 1	64 15	98 10	63 12	96 12	60 6	98 6	59 14	1,133 9	—
			Means	1,053	19 12	12 12	20 11	12 13	20 2	12 12	19 3	13 0	19 12	12 12	19 6	12 1	19 11	12 0	226 11	32 6

Ten Cows.—Sewaged Meadow Grass.

					Tuesday.		Wednesday.		Thursday.		Friday.		Saturday.		Sunday.		Monday.		Total in 7 days.	Per head per day.
Grass consumed.	From which Field, Plot, and Crop				Five-acre, Plot 2, Crop 1.		Five-acre, Plot 2, Crop 1.		Five-acre, Plot 2, Crop 1.		Ten-acre, Plot 3, Crop 1.		Ten-acre, Plot 3, Crop 1.		Ten-acre, Plot 2, Crop 1.		Ten-acre, Plot 2, Crop 1.		—	—
	Quantities weighed (*tons. cwts. qrs. lbs.*)				0 11 2 2		0 9 1 13		0 17 0 9		0 12 1 25		0 5 2 7		0 14 3 8		0 14 3 13		4 5 2 21	0 1 0 25
Yield of Milk, &c. 1	Cross short-horn	Aged	Mar. 10	1,136	17 2	13 9	17 10	12 11	17 12	12 6	17 12	13 11	18 0	13 10	18 7	12 6	16 8	10 15	212 7	30 6
2	Cross short-horn	Aged	April 7	1,010	21 3	13 8	22 4	13 14	21 11	14 2	22 1	14 8	23 1	14 2	22 0	12 4	20 10	13 0	248 4	35 7
3	Cross short-horn	6	Feb. 20	1,060	16 6	11 12	16 8	11 14	16 3	11 15	16 6	12 0	15 7	12 15	16 1	11 6	16 0	11 14	196 11	28 2
4	Cross short-horn	7	Feb. 15	990	16 0	10 11	14 15	10 14	15 10	10 11	16 4	11 2	16 10	11 0	16 2	9 7	15 0	9 8	183 14	26 4
5	Ayrshire	8	Feb. 22	984	13 11	10 10	14 7	10 8	15 3	10 5	14 8	11 7	16 2	9 8	15 2	10 7	13 4	8 12	173 14	24 13
6	Cross short-horn	6	April 14	956	19 11	12 10	20 4	12 6	19 0	13 12	20 10	13 7	21 6	13 0	21 0	11 2	18 2	11 8	227 14	32 9
7	Mongrel	Aged	April 12	838	17 4	10 15	17 3	10 12	17 13	11 6	18 0	12 3	20 12	12 3	19 2	11 0	16 0	9 14	204 7	29 3
8	Cross short-horn	6	April 16	1,026	12 11	15 11	13 5	16 1	13 0	15 10	10 13	16 2	10 3	14 14	10 4	10 1	10 7	10 2	179 9	25 11
9	Cross short-horn	7	April 13	954	18 0	12 10	18 5	14 10	17 4	15 0	18 12	13 9	17 12	13 12	13 1	11 8	20 0	10 9	219 12	31 6
10§	Half short-horn	Aged	Oct. 30	1,358	9 3	5 10	10 6	6 14	10 11	6 8	11 2	6 13	10 12	7 0	9 2	1 10	8 6	4 1	108 2	15 7
			Totals	10,312	161 3	117 10	165 3	120 8	164 3	121 11	166 4	124 14	170 6	122 0	165 5	101 3	154 5	100 3	1,954 14	—
			Means	1,031	16 2	11 12	16 8	12 1	16 7	12 3	16 10	12 8	17 1	12 3	16 8	10 2	15 7	10 0	195 8	27 15

Five Cows.—Unsewaged or Sewaged Italian Rye Grass.

					Tuesday.		Wednesday.		Thursday.		Friday.		Saturday.		Sunday.		Monday.		Total in 7 days.	Per head per day.
Grass consumed.	From which Field, Plot, and Crop				Rye, Plot 3, Crop 2.		Rye, Plot 3, Crop 2.		Rye, Plot 3, Crop 2.		Rye, Plot 3, Crop 2.		Rye, Plot 3, Crop 2.		Rye, Plot 3, Crop 2.		Rye, Plot 3, Crop 2.		—	—
	Quantities weighed (*tons. cwts. qrs. lbs.*)				0 7 1 23		0 7 1 9		0 7 2 7		0 11 0 23		0 4 3 25		0 6 3 26		0 6 3 25		2 12 1 26	0 1 2 0
Yield of Milk, &c. 1	Cross short-horn	Aged	April 20	1,122	28 6	18 8	28 10	21 0	28 4	17 0	28 6	20 12	28 0	18 10	27 3	18 4	26 10	16 0	325 9	46 8
2	Ayrshire	6	Mar. 15	902	19 9	11 6	19 11	12 0	20 0	13 0	20 1	13 2	19 13	11 15	19 5	9 13	19 0	11 9	220 4	31 7
3	Cross short-horn	Aged	Mar. 1	1,106	15 12	10 1	16 11	10 6	17 0	11 0	16 0	10 11	17 0	9 10	17 0	10 5	17 0	9 13	188 14	27 0
4	Cross short-horn	Aged	April 15	1,176	23 10	13 15	25 1	14 12	22 12	15 9	23 8	14 10	22 0	12 12	22 0	13 10	22 2	15 2	261 7	37 6
5	Cross short-horn	6	Jan. 2	1,048	14 6	9 12	15 5	9 2	14 0	11 7	14 2	10 3	14 7	8 10	13 4	7 12	15 0	7 10	165 0	23 9
			Totals	5,354	101 11	63 10	105 6	67 4	102 0	68 0	102 10	69 6	101 4	61 9	98 12	59 12	99 12	60 2	1,161 2	—
			Means	1,071	20 5	12 12	21 1	13 7	20 6	13 10	20 9	13 14	20 4	12 5	19 12	11 15	19 15	12 1	232 4	33 3

* [illegible] to these cows until the unsewaged meadow grass was ready for cutting. † Not experimental.

… days.—June 9 to June 15.

Five Cows.—Unsewaged Meadow Grass.

Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (May 25) lbs.	Tuesday. A.M. lbs. ozs.	Tuesday. P.M. lbs. ozs.	Wednesday. A.M. lbs. ozs.	Wednesday. P.M. lbs. ozs.	Thursday. A.M. lbs. ozs.	Thursday. P.M. lbs. ozs.	Friday. A.M. lbs. ozs.	Friday. P.M. lbs. ozs.	Saturday. A.M. lbs. ozs.	Saturday. P.M. lbs. ozs.	Sunday. A.M. lbs. ozs.	Sunday. P.M. lbs. ozs.	Monday. A.M. lbs. ozs.	Monday. P.M. lbs. ozs.	Total in 7 days. lbs. ozs.	Per head per day. lbs. ozs.
Grass consumed. From which Field, Plot, and Crop					Ten-acre, Plot 0*, Crop 1.		Ten-acre, Plot 0*, Crop 1.		Ten-acre, Plot 0*, Crop 1.		Ten-acre, Plot 0*, Crop 1.		Ten-acre, Plot 0*, Crop 1.		Ten-acre, Plot 0*, Crop 1.		Ten-acre, Plot 0*, Crop 1.		—	—
Quantities weighed (tons. cwts. qrs. lbs.)					0 9 3 4		0 6 0 5		0 9 3 17		0 8 2 2		0 5 0 10		0 5 1 7		0 5 1 7		2 9 3 24	0 1 1 20
Yield of Milk, &c.																				
1	Cross short-horn	Aged	May 1	1,062†	19 12	13 11	21 6	14 1	20 1	12 4	19 0	13 12	19 6	13 7	19 9	12 4	19 2	12 3	229 14	32 14
2	Cross short-horn	6	Feb. 15	1,177†	13 0	10 2	15 2	9 5	14 0	9 8	13 4	9 5	14 6	9 11	13 0	9 6	13 13	9 0	162 14	23 4
3	Cross short horn	3	April 13	821†	14 6	9 4	14 13	9 10	14 8	8 9	13 8	8 6	13 8	8 12	13 11	8 7	14 6	8 9	160 5	22 14
4	Cross short-horn	8	May 20	1,094†	24 8	19 1	26 3	17 6	23 4	17 9	22 0	16 15	23 12	17 0	23 4	16 4	23 4	15 6	285 12	40 13
5	Cross short horn	7	April 17	1,110†	19 8	12 4	20 0	12 6	20 4	12 1	19 7	12 0	19 12	12 0	20 6	11 10	20 1	11 8	223 3	31 14
			Totals	5,264	91 2	64 6	97 8	62 12	92 1	59 15	87 3	60 6	90 12	60 14	89 14	57 15	90 10	56 10	1,062 0	—
			Means	1,053	18 4	12 14	19 8	12 9	18 6	12 0	17 7	12 1	18 2	12 3	18 0	11 9	18 2	11 5	212 6	30 5

Ten Cows.—Sewaged Meadow Grass.

Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights lbs.	Tuesday. A.M.	Tuesday. P.M.	Wednesday. A.M.	Wednesday. P.M.	Thursday. A.M.	Thursday. P.M.	Friday. A.M.	Friday. P.M.	Saturday. A.M.	Saturday. P.M.	Sunday. A.M.	Sunday. P.M.	Monday. A.M.	Monday. P.M.	Total in 7 days.	Per head per day.
Grass consumed. From which Field, Plot, and Crop					Ten-acre, Plot 2, Crop 1.		Ten-acre, Plot 2, Crop 1.		Ten-acre, Plot 2, Crop 1.		Ten-acre, Plot 2, Crop 1.		Ten-acre, Plot 2, Crop 1.		Ten-acre, Plot 2, Crop 1.		Ten-acre, Plot 2, Crop 1.		—	—
Quantities weighed (tons. cwts. qrs. lbs.)					0 11 0 21		0 12 3 21		0 11 3 1		0 12 2 0		0 13 3 25		0 9 3 17		0 9 3 19		4 2 0 20	0 1 0 20
Yield of Milk, &c.																				
1	Cross short-horn	Aged	Mar. 10	1,136	17 3	12 8	16 7	11 10	15 10	10 9	14 10	9 7	15 0	10 0	14 14	10 1	14 10	10 4	182 13	26 2
2	Cross short horn	Aged	April 7	1,010	21 0	14 0	21 10	12 14	20 2	13 2	19 0	13 6	18 0	12 10	18 2	11 0	18 12	11 6	225 0	32 2
3	Cross short-horn	6	Feb. 20	1,060	16 8	10 3	15 13	12 6	15 12	10 8	14 12	12 4	14 2	11 12	14 0	11 8	14 6	9 11	183 9	26 4
4	Cross short-horn	7	Feb. 15	990	14 1	10 4	15 0	9 12	14 2	10 9	15 10	10 8	14 14	10 6	15 0	9 12	15 0	9 8	174 6	24 14
5	Ayrshire	3	Feb. 22	984	14 0	9 11	13 2	10 8	14 4	10 0	13 12	9 7	13 0	10 10	13 6	9 3	14 4	8 14	164 1	23 7
6	Cross short-horn	6	April 14	956	18 3	12 11	19 0	11 7	18 0	12 2	17 13	12 8	19 1	11 0	17 8	11 7	18 0	11 4	210 0	30 0
7	Mongrel	Aged	April 12	838	16 0	11 4	17 1	10 9	16 8	10 4	17 0	10 2	15 6	11 2	16 0	9 4	15 3	9 1	184 12	26 6
8	Cross short-horn	6	April 16	1,026	10 2	14 5	10 6	13 14	11 12	13 2	9 11	12 9	9 4	12 4	10 12	10 0	11 8	10 14	160 7	22 15
9	Cross short horn	7	April 13	954	16 7	14 3	19 4	12 2	17 2	13 10	16 12	12 6	17 4	11 10	17 10	11 2	18 0	11 8	209 0	29 14
10	Half short-horn	Aged	Oct. 30	1,358	6 4	5 0	6 6	5 12	7 0	5 10	7 6	6 2	8 12	5 15	8 10	6 0	8 1	6 1	92 15	13 4
			Totals	10,312	149 12	114 1	154 1	110 14	150 4	109 8	146 6	108 11	144 11	107 5	145 14	99 5	147 12	98 7	1,786 15	—
			Means	1,031	15 0	11 6	15 7	11 1	15 0	10 15	14 10	10 14	14 8	10 12	14 9	9 15	14 12	9 14	178 11	25 8

Five Cows.—Unsewaged or Sewaged Italian Rye Grass.

Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights lbs.	Tuesday. A.M.	Tuesday. P.M.	Wednesday. A.M.	Wednesday. P.M.	Thursday. A.M.	Thursday. P.M.	Friday. A.M.	Friday. P.M.	Saturday. A.M.	Saturday. P.M.	Sunday. A.M.	Sunday. P.M.	Monday. A.M.	Monday. P.M.	Total in 7 days.	Per head per day.
Grass consumed. From which Field, Plot, and Crop					Rye, Plot 3, Crop 2.		Rye, Plot 3, Crop 2.		Rye, Plot 3, Crop 2.		Rye, Plots 2 &3, Crop 2.		Rye, Plot 2, Crop 2.		Rye, Plot 2, Crop 2.		Rye, Plot 2, Crop 2.		—	—
Quantities weighed (tons. cwts. qrs. lbs.)					0 9 3 23		0 6 0 15		0 6 3 3		0 11 0 10		0 7 2 19		0 8 1 25		0 8 1 26		2 18 2 9	0 1 2 19
Yield of Milk, &c.																				
1	Cross short-horn	Aged	April 20	1,122	26 10	18 1	27 1	15 5	26 0	18 5	25 4	16 14	26 0	16 12	26 0	16 3	23 0	14 5	295 12	42 4
2	Ayrshire	6	Mar. 15	902	19 0	13 3	20 3	13 3	19 14	12 1	18 11	11 0	17 12	13 4	19 10	11 0	19 6	10 9	218 12	31 4
3	Cross short-horn	Aged	Mar. 1	1,106	17 0	10 11	16 15	9 6	14 4	10 11	15 0	10 2	15 3	9 11	15 4	9 3	15 0	9 5	177 11	25 6
4	Cross short-horn	Aged	April 15	1,176	22 2	16 3	22 8	15 0	23 15	14 12	22 0	12 10	22 5	14 14	21 12	13 2	23 3	13 5	257 11	36 13
5	Cross short-horn	6	Jan. 2	1,048	13 1	9 8	14 10	8 12	13 2	9 14	12 14	8 14	12 13	8 12	13 6	8 12	14 8	7 14	156 12	22 6
			Totals	5,354	97 13	67 10	101 5	61 10	97 3	65 11	93 13	59 8	94 1	63 5	96 0	58 4	95 1	55 6	1,106 10	—
			Means	1,071	19 9	13 8	20 4	12 5	19 7	13 2	18 12	11 15	18 13	12 11	19 3	11 11	19 0	11 1	221 5	31 10

* Unmeasured land, designated Plot 0 when unsewaged.

† These weights were taken on June 8, preparatory to commencing the unsewaged meadow grass.

Table X.—*continued*.

Detailed Record of Food consumed, and Milk yielded, by Cows fed on Unsewaged and Sewaged Meadow Grass, and on Italian Rye Grass (without Oilcake).
Third Season, 1863; 7 days.—June 16 to June 22.

Five Cows.—Unsewaged Meadow Grass.

					Tuesday.		Wednesday.		Thursday.		Friday.		Saturday.		Sunday.		Monday.		Total in 7 days.	Per head per day.
Grass consumed.	From which Field, Plot, and Crop				Five-acre, Plot 0,* Crop 1.		Five-acre, Plot 0,* Crop 1.		Five-acre, Plot 0,* Crop 1.		—		Five-acre, Plot 0,* Crop 1.		Five-acre, Plot 0,* Crop 1.		Five-acre, Plot 0*, Crop 1.		—	—
	Quantities weighed (*tons. cwts. qrs. lbs.*)				0 5 3 17½		0 6 3 0½		0 7 2 8½		—		0 3 0 22½		0 6 0 0½		0 5 3 27		1 15 1 20½	0 1 0 1
Yield of Milk, &c. Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (June 22). *lbs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	— *lbs. ozs.*	— *lbs. ozs.*
1	Cross short-horn	Aged	May 1	1,078	19 7	12 4	20 3	12 15	20 4	12 11	21 4	12 10	20 8	12 14	20 0	12 10	20 4	12 6	230 4	32 14
2	Cross short-horn	6	Feb. 15	1,190	13 5	10 3	13 0	10 4	12 14	10 0	13 11	10 0	13 7	10 1	13 8	6 15	13 3	9 7	159 14	22 13
3	Cross short-horn	3	April 13	804	13 12	8 4	14 0	8 10	14 7	8 13	14 7	8 8	12 4	8 12	14 1	8 0	14 2	8 4	156 4	22 5
4	Cross short-horn	8	May 20	1,069	22 2	16 10	22 1	16 12	23 0	16 12	23 4	17 6	22 4	16 11	22 15	16 2	22 6	15 8	273 13	39 2
5	Cross short-horn	7	April 17	1,097	19 7	10 9	20 14	11 4	19 8	11 12	19 11	11 2	18 8	12 2	19 4	10 0	20 8	10 11	215 4	30 12
			Totals	5,238	88 1	57 14	90 2	59 13	90 1	60 0	92 5	59 10	86 15	60 8	89 12	53 11	90 7	56 4	1,035 7	—
			Means	1,048	17 10	11 9	18 0	11 15	18 0	12 0	18 7	11 15	17 6	12 2	17 15	10 12	18 1	11 4	207 1	29 9

Ten Cows.—Sewaged Meadow Grass.

					Tuesday.		Wednesday.		Thursday.		Friday.		Saturday.		Sunday.		Monday.		Total in 7 days.	Per head per day.
Grass consumed.	From which Field, Plot, and Crop				Five-acre, Plot 2, Crop 1.		Five-acre, Plot 2, Crop 1.		Five-acre, Plot 2, Crop 1.		Ten-acre, Plot 2, Crop 1.		Ten-acre, Plot 4, Crop 2.		Five-acre, Plot 4, Crop 2.		Five-acre, Plot 4, Crop 2.		—	—
	Quantities weighed (*tons. cwts. qrs. lbs.*)				0 12 3 17		0 5 1 8		0 7 2 10		0 12 1 6		0 15 1 25		0 9 1 27		0 9 2 6		3 12 1	0 1 0 4
Yield of Milk, &c. 1	Cross short-horn	Aged	Mar. 10	1,121	13 4	10 3	15 0	11 4	14 14	11 7	14 7	11 11	14 5	11 14	14 4	10 10	14 6	9 8	177 1	25 5
2†	Cross short-horn	8	June 15	1,280	17 0	10 13	18 13	13 0	18 9	12 11	19 5	12 7	18 10	13 8	19 0	10 0	16 4	9 0	209 0	29 14
3	Cross short-horn	6	Feb. 20	1,066	13 1	11 0	13 2	12 0	13 3	12 2	13 7	10 7	13 2	11 0	13 8	9 4	13 5	8 6	166 15	23 13
4	Cross short-horn	7	Feb. 15	996	13 6	9 6	14 0	10 0	14 2	10 0	14 1	10 0	13 10	10 2	14 7	8 8	14 4	8 0	163 14	23 7
5	Ayrshire	8	Feb. 22	1,000	14 8	9 10	14 1	9 12	14 8	9 14	14 10	10 1	13 11	9 5	13 12	8 0	13 0	8 1	162 13	23 4
6	Cross short-horn	6	April 14	958	17 0	11 0	16 12	12 1	17 0	12 15	16 11	11 4	16 7	11 3	16 0	10 4	15 0	10 6	193 15	27 11
7	Mongrel	Aged	April 12	894	15 4	9 6	15 2	9 9	14 8	9 10	15 4	10 3	14 10	9 8	14 6	7 6	12 0	7 6	164 2	23 7
8	Cross short-horn	6	April 16	1,068	10 6	12 6	11 3	12 3	9 0	12 15	10 0	9 12	12 0	11 15	11 11	8 6	11 4	8 2	151 3	21 10
9	Cross short-horn	7	April 13	964	17 1	10 15	17 14	10 13	17 11	12 8	18 0	11 2	17 6	12 14	16 0	9 4	16 12	11 10	199 14	28 9
10‡	Half short-horn	8	April 25	1,186	8 4	6 0	8 4	6 13	8 12	6 4	8 10	7 0	8 2	6 8	8 9	6 0	8 4	6 1	103 7	14 12
			Totals	10,533	139 2	100 11	144 3	107 7	142 3	110 6	144 7	103 15	141 15	107 13	141 9	87 10	134 7	86 8	1,692 4	—
			Means	1,053	13 15	10 1	14 7	10 12	14 3	11 1	14 7	10 6	14 3	10 13	14 3	8 12	13 7	8 10	169 4	24 3

Five Cows.—Unsewaged or Sewaged Italian Rye Grass.

					Tuesday.		Wednesday.		Thursday.		Friday.		Saturday.		Sunday.		Monday.		Total in 7 days.	Per head per day.
Grass consumed.	From which Field, Plot, and Crop				Rye, Plot 2, Crop 2.		Rye, Plot 2, Crop 2.		Rye, Plot 2, Crop 2.		Rye, Plot 2, Crop 2.		Rye, Plot 2, Crop 2.		Rye, Plot 2, Crop 2.		Rye, Plot 2, Crop 2.		—	—
	Quantities weighed (*tons. cwts. qrs. lbs.*)				0 6 2 26		0 12 0 19		0 6 0 23		0 6 1 15		0 8 1 15		0 7 1 9		0 7 1 14		2 14 2 9	0 1 2 7
Yield of Milk, &c. 1	Cross short-horn	Aged	April 20	1,122	22 8	14 6	25 6	17 14	27 0	16 2	26 3	16 10	23 14	17 0	22 10	14 2	21 6	14 11	279 12	39 15
2	Ayrshire	6	Mar. 15	878	17 11	11 6	18 10	11 9	19 1	11 14	19 13	11 10	18 10	11 2	17 11	9 4	17 0	9 14	205 3	29 5
3	Cross short-horn	Aged	Mar. 1	1,087	14 5	10 0	15 4	10 9	14 15	9 11	15 4	10 3	14 12	9 5	14 15	8 5	15 8	8 6	171 6	24 8
4	Cross short-horn	Aged	April 15	1,180	19 5	13 12	20 10	13 6	21 8	12 2	21 2	13 10	20 0	12 14	20 2	12 14	20 0	12 7	233 12	33 6
5	Cross short-horn	6	Jan. 2	1,128	14 2	8 6	13 6	10 3	12 10	8 15	13 8	10 3	12 1	8 6	12 3	8 2	12 8	8 0	152 9	21 13
			Totals	5,395	87 15	57 14	93 4	63 9	95 2	58 12	95 14	62 4	89 5	58 11	87 9	52 11	86 6	53 6	1,042 10	—
			Means	1,079	17 9	11 9	18 11	12 11	19 0	11 12	19 3	12 7	17 14	11 12	17 8	10 9	17 4	10 11	208 8	29 13

Detailed Record of Food consumed, and Milk yielded, by Cows fed on Unsewaged and Sewaged Meadow Grass, and on Italian Rye Grass (without Oilcake).
Third Season, 1863; 7 days.—June 23 to June 29.

Five Cows.—Unsewaged Meadow Grass.

Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (June 22) *lbs.*	Tuesday. A.M.	Tuesday. P.M.	Wednesday. A.M.	Wednesday. P.M.	Thursday. A.M.	Thursday. P.M.	Friday. A.M.	Friday. P.M.	Saturday. A.M.	Saturday. P.M.	Sunday. A.M.	Sunday. P.M.	Monday. A.M.	Monday. P.M.	Total in 7 days.	Per head per day.
Grass consumed. From which Field, Plot, and Crop					Ten-acre, Plot 0*, Crop 1.		Five-acre, Plot 0*, Crop 1.		Ten-acre, Plot 1, Crop 1.		Ten-acre, Plot 1, Crop 1.		Ten-acre, Plot 1, Crop 1.		Ten-acre, Plot 1, Crop 1.		Ten-acre, Plot 1, Crop 1.		—	—
Quantities weighed (*tons. cwts. qrs. lbs.*)					†0 12 2 22		0 4 0 4		0 2 3 23½		0 4 0 1½		0 4 2 7½		0 2 1 22½		0 2 1 26		1 13 0 23	0 0 3 22
Yield of Milk, &c.					*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*
1	Cross short-horn	Aged	May 1	1,078	19 1	12 10	19 0	12 6	19 3	12 0	18 1	11 4	18 1	12 8	19 4	11 0	18 10	10 13	213 13	30 9
2	Cross short-horn	6	Feb. 15	1,190	12 2	9 12	13 3	9 5	13 5	9 1	12 12	9 3	13 0	8 1	12 10	7 12	12 8	8 0	150 10	21 8
3	Cross short-horn	3	April 13	804	13 2	8 9	13 8	8 12	13 4	8 2	12 10	8 0	12 0	7 11	12 8	7 3	12 8	7 6	145 3	20 12
4	Cross short-horn	8	May 20	1,069	21 6	14 14	22 14	15 6	23 0	16 3	21 4	16 14	20 8	15 9	22 0	13 0	23 0	14 12	260 10	37 4
5	Cross short-horn	7	April 17	1,097	18 3	11 14	18 10	11 0	18 0	11 12	18 2	11 0	18 6	11 7	18 12	10 1	19 6	10 10	207 3	29 9
			Totals	5,238	83 14	57 11	87 3	56 13	86 12	57 2	82 13	56 5	81 15	55 4	85 2	49 0	86 0	51 9	977 7	—
			Means	1,048	16 12	11 9	17 7	11 6	17 6	11 7	16 9	11 4	16 6	11 1	17 0	9 13	17 3	10 5	195 8	27 15

Ten Cows.—Sewaged Meadow Grass.

Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (June 22) *lbs.*	Tuesday. A.M.	Tuesday. P.M.	Wednesday. A.M.	Wednesday. P.M.	Thursday. A.M.	Thursday. P.M.	Friday. A.M.	Friday. P.M.	Saturday. A.M.	Saturday. P.M.	Sunday. A.M.	Sunday. P.M.	Monday. A.M.	Monday. P.M.	Total in 7 days.	Per head per day.
Grass consumed. From which Field, Plot, and Crop					Five-acre, Plot 4, Crop 2.		Five-acre, Plot 3, Crop 2.		Five-acre, Plot 3, Crop 2.		Ten-acre, Plot 3, Crop 2.		Ten-acre, Plot 3, Crop 2.		Ten-acre, Plot 3, Crop 2.		Ten-acre, Plot 3, Crop 2.		—	—
Quantities weighed (*tons. cwts. qrs. lbs.*)					0 13 2 1		0 14 3 19		0 13 1 18		0 11 2 10		0 9 0 25		0 12 1 22		0 12 1 27		4 7 2 10	0 1 1 0
Yield of Milk, &c.																				
1	Cross short-horn	Aged	Mar. 10	1,121	13 4	10 4	15 4	10 8	16 1	10 3	14 0	11 14	14 14	12 0	16 4	11 8	16 12	10 14	183 10	26 4
2	Cross short-horn	8	June 15	1,280	13 8	9 10	18 5	13 11	18 6	13 14	18 5	13 11	21 0	16 8	22 6	14 2	23 8	15 4	232 2	33 3
3	Cross short-horn	6	Feb. 20	1,066	13 0	9 11	14 2	10 4	14 3	10 0	15 6	10 6	12 8	12 3	14 2	10 3	14 14	11 11	172 9	24 10
4	Cross short-horn	7	Feb. 15	996	12 2	8 1	13 6	9 0	13 4	7 13	12 7	8 10	12 0	8 12	14 3	8 6	14 6	9 3	151 9	21 10
5	Ayrshire	8	Feb. 22	1,000	12 3	8 3	13 2	10 3	13 7	9 6	12 12	9 6	13 0	10 0	13 8	8 10	15 7	8 8	157 11	22 8
6	Cross short-horn	6	April 14	958	15 8	11 10	17 6	10 7	18 4	10 0	17 12	10 6	18 4	11 13	18 7	9 9	16 14	11 6	197 10	28 4
7	Mongrel	Aged	April 12	894	12 3	8 0	13 1	8 7	13 0	8 1	12 8	8 4	12 14	8 14	13 10	7 7	13 8	8 1	147 14	21 2
8	Cross short-horn	0	April 16	1,068	10 2	11 14	10 7	11 12	10 7	8 5	10 11	8 12	11 10	8 12	10 8	9 8	11 14	8 14	143 8	20 8
9	Cross short-horn	7	April 13	964	15 0	11 9	15 0	10 8	15 0	10 13	14 0	9 3	16 2	10 0	17 9	11 14	15 5	10 11	182 10	26 2
10	Half short-horn	8	April 25	1,186	23 3	16 0	22 9	14 2	22 6	15 0	19 0	16 2	21 0	18 1	23 8	13 4	23 12	14 2	262 1	37 7
			Totals	10,533	140 1	104 14	152 10	108 14	154 6	103 7	146 13	106 10	153 4	116 15	161 1	101 7	166 4	108 10	1,831 4	—
			Means	1,053	14 0	10 8	15 4	10 14	15 7	10 5	14 11	10 11	15 5	11 11	16 7	10 7	16 10	10 14	183 2	26 3

Five Cows.—Unsewaged or Sewaged Italian Rye Grass.

Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (June 22) *lbs.*	Tuesday. A.M.	Tuesday. P.M.	Wednesday. A.M.	Wednesday. P.M.	Thursday. A.M.	Thursday. P.M.	Friday. A.M.	Friday. P.M.	Saturday. A.M.	Saturday. P.M.	Sunday. A.M.	Sunday. P.M.	Monday. A.M.	Monday. P.M.	Total in 7 days.	Per head per day.
Grass consumed. From which Field, Plot, and Crop					Rye, Plot 2, Crop 2.		Rye, Plot 2, Crop 2.		Rye, Plot 2, Crop 2, & Plot 3, Crop 3.		Rye, Plot 3, Crop 3.		Rye, Plot 3, Crop 3.		Rye, Plot 3, Crop 3.		Rye, Plot 3, Crop 3.		—	—
Quantities weighed (*tons. cwts. qrs. lbs.*)					0 6 1 0		0 8 2 2		0 6 2 25		0 5 0 10		0 9 0 23		0 5 3 2		0 5 3 7		2 7 1 13	0 1 1 12
Yield of Milk, &c.																				
1	Cross short-horn	Aged	April 20	1,122	21 6	15 0	23 12	14 5	22 0	14 6	22 0	14 10	20 0	13 7	20 8	13 6	23 9	12 12	251 1	35 14
2	Ayrshire	6	Mar. 15	873	16 4	10 5	17 3	10 10	17 0	11 4	16 0	10 12	17 10	10 0	16 12	9 4	17 2	10 11	190 13	27 4
3	Cross short-horn	Aged	Mar 1	1,087	14 8	10 0	14 15	9 10	15 3	9 1	15 1	10 2	15 0	9 8	14 6	8 9	15 10	7 15	169 8	24 3
4	Cross short-horn	Aged	April 15	1,180	20 0	13 0	19 11	12 0	19 8	18 10	20 4	13 0	18 14	12 4	18 13	12 7	20 0	11 7	224 14	32 2
5	Cross short horn	6	Jan. 2	1,128	12 1	8 12	11 4	8 6	11 12	8 0	12 4	8 1	11 12	6 13	12 0	8 0	12 7	7 2	138 10	19 13
			Totals	5,395	84 3	57 1	86 13	54 15	85 7	56 5	85 9	56 9	83 4	52 0	82 7	51 10	88 12	49 15	974 14	—
			Means	1,079	16 13	11 7	17 6	11 0	17 2	11 4	17 2	11 5	16 10	10 6	16 8	10 5	17 12	10 0	195 0	27 14

* Unmeasured land, designated Plot 0 when unsewaged.

† Including about 3 cwts. off Five-acre, Plot 0, Crop 1.

Table X.—*continued.*

Detailed Record of Food consumed, and Milk yielded, by Cows fed on Unsewaged and Sewaged Meadow Grass, and on Italian Rye Grass (without Oilcake). Third Season, 1863; 7 days.—June 30 to July 6.

Five Cows.—Unsewaged Meadow Grass.

						Tuesday.		Wednesday.		Thursday.		Friday.		Saturday.		Sunday.		Monday.		Total in 7 days.	Per head per day.
Grass consumed.	From which Field, Plot, and Crop					Ten-acre, Plot 1, Crop 1.		Ten-acre, Plot 1, Crop 1.		Ten-acre, Plot 1, Crop 1.		Ten-acre, Plot 1, Crop 1.		Ten-acre, Plot 1, Crop 1.		Ten-acre, Plot 1, Crop 1.		Ten-acre, Plot 1, Crop 1.		—	—
	Quantities weighed (*tons. cwts. qrs. lbs.*)					0 4 3 6½		0 2 2 21½		0 4 1 25½		0 6 0 10		0 5 3 10¼		0 4 1 13¾		0 4 0 1		1 12 1 4½	0 0 3 19
Yield of Milk, &c.	Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (June 22) *lbs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*
	1	Cross short-horn	Aged	May 1	1,078	18 2	10 14	18 2	10 11	17 11	10 9	18 2	11 12	17 8	7 3	18 8	11 0	18 5	10 6	198 13	28 6
	2	Cross short-horn	6	Feb. 15	1,190	13 3	7 13	13 0	8 4	12 7	7 10	12 10	8 2	12 7	7 9	13 4	7 1	13 8	7 14	144 12	20 11
	3	Cross short-horn	3	April 13	804	12 7	7 9	13 2	7 10	12 13	7 14	12 14	8 3	12 10	11 3	13 0	7 12	12 12	7 5	147 2	21 0
	4	Cross short-horn	8	May 20	1,069	22 5	15 0	21 11	14 15	21 7	14 2	22 6	14 8	21 11	14 10	23 3	12 10	22 14	15 14	257 4	36 12
	5	Cross short-horn	7	April 17	1,097	18 0	10 8	18 10	10 4	16 0	11 0	17 0	10 12	18 2	11 13	18 2	12 1	17 12	9 0	199 0	28 7
				Totals	5,238	84 1	51 12	84 9	51 12	80 6	51 3	88 0	53 5	82 6	52 6	86 1	50 8	85 3	50 7	946 15	—
				Means	1,048	16 13	10 6	16 14	10 6	16 1	10 4	16 9	10 11	16 7	10 8	17 3	10 2	17 1	10 1	189 6	27 1

Ten Cows.—Sewaged Meadow Grass.

						Tuesday.		Wednesday.		Thursday.		Friday.		Saturday.		Sunday.		Monday.		Total in 7 days.	Per head per day.
Grass consumed.	From which Field, Plot, and Crop					Five-acre, Plot 3, Crop 2.		Five-acre, Plot 3, Crop 2.		Five-acre, Plot 3, Crop 2.		Ten-acre, Plot 3, Crop 2.		Ten-acre, Plot 3, Crop 2.		Ten-acre, Plot 3, Crop 2.		Ten-acre, Plot 3, Crop 2.		—	—
	Quantities weighed (*tons. cwts. qrs. lbs.*)					0 16 3 23		0 17 3 18		0 18 3 27		0 12 0 0		0 15 1 21		0 12 2 12		0 12 2 18		5 6 2 7	0 1 2 2
Yield of Milk, &c.	1	Cross short-horn	Aged	Mar. 10	1,121	15 10	11 13	17 6	12 9	17 3	12 5	17 12	11 6	16 4	12 7	17 8	9 14	15 7	12 0	199 8	28 8
	2	Cross short-horn	8	June 15	1,280	21 4	15 4	22 8	16 2	22 0	15 14	22 12	16 8	22 6	16 8	23 4	14 6	22 10	16 0	267 6	38 3
	3	Cross short-horn	6	Feb. 20	1,066	14 1	12 6	14 5	12 10	14 1	11 10	13 11	11 7	13 7	11 2	13 0	10 0	12 7	11 7	175 10	25 2
	4	Cross short-horn	7	Feb. 15	996	12 10	9 14	14 3	8 15	14 0	9 6	14 0	9 13	14 0	9 12	15 0	9 4	14 3	9 8	164 8	23 8
	5	Ayrshire - -	8	Feb. 22	1,000	13 4	9 7	15 4	8 11	14 13	10 2	13 10	9 8	13 4	9 12	13 12	9 3	14 4	9 11	164 9	23 8
	6	Cross short-horn	6	April 14	958	17 2	11 3	18 0	12 3	17 15	11 7	18 14	12 6	17 11	11 9	17 2	10 5	18 0	11 9	205 6	29 5
	7	Mongrel - -	Aged	April 12	894	12 13	9 2	14 4	8 3	14 0	9 4	14 0	9 11	14 12	9 5	15 0	8 0	14 10	9 4	162 4	23 3
	8	Cross short-horn	6	April 16	1,068	11 2	9 6	11 8	9 12	12 5	9 2	11 4	10 0	11 0	9 10	11 0	9 8	12 0	8 9	146 2	20 14
	9	Cross short horn	7	April 13	964	16 0	11 11	18 9	10 7	17 15	11 8	15 11	12 11	16 1	14 12	15 6	11 10	16 8	10 4	199 1	28 7
	10	Half short-horn	8	April 25	1,186	22 0	14 6	23 0	14 15	22 12	15 5	22 9	14 4	21 10	10 14	23 2	13 8	22 6	14 4	254 15	36 7
				Totals	10,533	155 14	114 8	168 15	114 7	167 0	115 15	164 3	117 10	160 7	115 11	164 2	105 10	162 7	112 8	1,939 5	—
				Means	1,053	15 9	11 7	16 14	11 7	16 11	11 10	16 7	11 12	16 1	11 9	16 7	10 9	16 4	11 4	193 15	27 11

Five Cows.—Unsewaged or Sewaged Italian Rye Grass.

						Tuesday.		Wednesday.		Thursday.		Friday.		Saturday.		Sunday.		Monday.		Total in 7 days.	Per head per day.
Grass consumed.	From which Field, Plot, and Crop					Rye, Plot 3, Crop 3.		Rye, Plot 3, Crop 3.		Rye, Plot 8, Crop 3.		Rye, Plot 3, Crop 3.		Rye, Plot 3, Crop 3.		Rye, Plot 3, Crop 3.		Rye, Plot 3, Crop 3.		—	—
	Quantities weighed (*tons. cwts. qrs. lbs.*)					0 10 1 6		0 7 1 19		0 6 0 23		0 11 0 16		0 6 3 23		0 6 3 23		0 7 0 0		2 15 3 26	0 1 2 11
Yield of Milk, &c.	1	Cross short horn	Aged	April 20	1,122	21 8	13 13	22 9	15 5	22 6	14 0	22 2	14 1	22 0	13 12	21 8	13 14	21 8	13 12	252 2	36 0
	2	Ayrshire - -	6	Mar. 15	878	17 7	11 2	19 8	10 9	18 12	11 0	17 12	11 4	18 14	11 2	18 0	10 5	17 11	10 7	203 13	29 2
	3	Cross short-horn	Aged	Mar. 1	1,087	14 1	9 0	14 11	9 9	14 12	10 1	15 8	9 12	14 4	9 10	14 14	8 15	14 10	4 7	164 2	23 7
	4	Cross short-horn	Aged	April 15	1,180	19 1	13 0	10 9	13 0	19 1	12 14	18 6	11 8	17 0	13 6	18 0	11 4	18 12	10 7	215 4	30 12
	5	Cross short-horn	6	Jan. 2	1,128	11 3	8 0	11 9	8 3	11 7	8 5	11 6	8 0	12 0	7 14	13 0	7 4	12 0	8 15	139 2	19 14
				Totals	5,395	83 4	54 15	87 14	56 10	86 6	56 4	85 2	54 9	84 2	55 12	85 6	51 10	84 9	48 0	974 7	—

… yielded, by Cows fed on Unsewaged and Sewaged Meadow Grass, and on Italian Rye Grass (without Oilcake). Third Season, 1863; 7 days.—July 7 to July 13.

Five Cows.—Unsewaged Meadow Grass.

					Tuesday.		Wednesday.		Thursday.		Friday.		Saturday.		Sunday.		Monday.		Total in 7 days.	Per head per day.
Grass consumed. From which Field, Plot, and Crop					—		—		Ten-acre, Plot 1, Crop 1.		Ten-acre, Plot 1, Crop 1.		Ten-acre, Plot 1, Crop 1.		Five-acre, Plot 1, Crop 1.		Five-acre, Plot 1, Crop 1.		—	—
Quantities weighed (*tons. cwts. qrs. lbs.*)					—		—		0 4 2 24½		0 3 1 3¾		0 4 3 10½		0 1 1 17½		0 1 1 20		0 15 2 20	0 0 1 22
Yield of Milk, &c. Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (June 22) *lbs.*	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	—	—
					lbs. ozs.	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*
1	Cross short-horn	Aged	May 1	1,078	17 13	10 8	17 8	10 12	18 0	11 3	17 0	10 13	18 0	11 8	18 2	10 3	18 11	11 3	201 4	28 12
2	Cross short-horn	6	Feb. 15	1,190	12 7	8 6	12 11	8 8	12 7	8 13	12 10	8 2	12 12	8 9	12 7	7 10	13 11	7 8	146 9	20 15
3	Cross short horn	3	April 13	804	12 3	7 13	13 0	7 14	12 13	7 15	12 10	7 14	13 5	7 12	13 2	7 9	13 10	8 5	145 13	20 13
4	Cross short-horn	8	May 20	1,069	21 8	15 0	22 1	15 14	21 5	14 7	21 0	14 6	23 0	15 13	21 10	14 2	24 0	14 12	258 14	37 0
5	Cross short-horn	7	April 17	1,097	16 6	10 4	17 3	10 6	18 2	11 2	17 4	11 3	18 4	10 11	18 15	10 5	19 5	10 12	200 2	28 9
			Totals	5,238	80 5	51 15	82 7	53 6	82 11	53 8	80 8	52 6	85 5	54 5	84 4	49 13	89 5	52 8	952 10	—
			Means	1,048	16 1	10 6	16 8	10 11	16 9	10 11	16 1	10 8	17 1	10 14	16 13	9 15	17 14	10 8	190 8	27 3

Ten Cows.—Sewaged Meadow Grass.

					Tuesday.		Wednesday.		Thursday.		Friday.		Saturday.		Sunday.		Monday.		Total in 7 days.	Per head per day.
Grass consumed. From which Field, Plot, and Crop					Five-acre, Plot 3, Crop 2.		Five-acre, Plot 3, Crop 2.		Five-acre, Plot 3, Crop 2.		Ten-acre, Plot 3, Crop 2.		Ten-acre, Plot 3, Crop 2.		Five-acre, Plot 3, Crop 2.		Five-acre, Plot 3, Crop 2.		—	—
Quantities weighed (*tons. cwts. qrs. lbs.*)					0 14 3 13		0 16 1 13		0 18 1 18		0 19 3 20		1 0 2 4		0 12 1 2		0 12 1 7		5 14 2 21	0 1 2 16
1	Cross short-horn	Aged	Mar. 10	1,121	15 6	12 14	16 0	13 2	17 4	11 3	16 6	12 3	17 0	12 9	16 10	12 0	17 0	11 7	201 0	28 11
2	Cross short-horn	8	June 15	1,280	23 4	16 6	22 2	17 0	23 0	16 11	21 12	15 10	22 6	16 12	23 6	15 1	23 3	15 9	272 2	38 14
3	Cross short-horn	6	Feb. 20	1,066	13 0	11 3	13 4	9 12	13 8	11 1	12 5	11 12	13 10	11 10	14 7	10 2	13 12	9 14	169 4	24 3
4	Cross short-horn	7	Feb. 15	996	14 8	9 3	14 0	11 5	14 3	10 4	13 0	9 1	14 6	9 14	14 5	8 8	14 4	8 4	165 1	23 9
5	Ayrshire	8	Feb. 22	1,000	14 10	9 8	14 3	10 4	14 4	9 4	13 8	9 1	14 2	10 8	14 4	9 2	14 12	9 0	166 6	23 12
6	Cross short-horn	6	April 14	958	18 8	10 15	17 13	11 10	18 1	10 0	16 3	12 8	18 0	11 3	18 2	10 10	18 2	10 5	202 0	28 14
7	Mongrel	Aged	April 12	894	14 2	8 14	14 2	10 2	18 0	11 10	14 0	9 0	14 5	9 13	15 0	8 12	16 1	8 4	172 1	24 9
8	Cross short-horn	6	April 16	1,068	12 0	10 0	11 13	9 13	11 4	9 10	11 10	10 4	12 9	9 12	13 0	9 0	12 2	9 10	152 7	21 13
9	Cross short horn	7	April 13	964	17 12	11 7	17 9	12 7	17 0	12 6	16 0	12 6	16 8	11 6	15 8	10 4	15 3	13 1	198 13	28 6
10	Half short-horn	8	April 25	1,186	21 4	15 13	22 0	15 3	22 12	17 4	18 11	17 9	21 2	16 4	20 1	15 0	21 12	15 0	259 11	37 2
			Totals	10,533	164 6	116 3	162 14	120 10	169 4	119 5	153 7	119 6	164 0	119 11	164 11	108 7	166 3	110 6	1,958 13	—
			Means	1,053	16 7	11 10	16 5	12 1	16 15	11 15	15 5	11 15	16 6	11 15	16 7	10 14	16 10	11 1	195 14	28 0

Five Cows.—Unsewaged or Sewaged Italian Rye Grass.

					Tuesday.		Wednesday.		Thursday.		Friday.		Saturday.		Sunday.		Monday.		Total in 7 days.	Per head per day.
Grass consumed. From which Field, Plot, and Crop					Rye, Plot 3, Crop 3.		Rye, Plot 3, Crop 3.		Rye, Plot 3, Crop 3.		Rye, Plot 3, Crop 3.		Rye, Plot 3, Crop 3.		Rye, Plot 3, Crop 3.		Rye, Plot 3, Crop 3.		—	—
Quantities weighed (*tons. cwts. qrs. lbs.*)					0 9 0 23		0 14 0 23		0 5 2 23		0 7 2 23		0 9 0 5		0 7 3 1		0 7 3 1		3 1 1 15	0 1 3 0
1	Cross short-horn	Aged	April 20	1,122	21 6	12 14	21 12	12 14	21 14	13 0	20 3	13 11	23 2	13 7	21 4	12 3	23 10	14 3	245 7	35 1
2	Ayrshire	6	Mar. 15	878	17 0	12 0	17 9	9 6	17 0	10 15	17 1	10 9	16 12	10 0	16 3	9 8	17 7	10 6	191 12	27 6
3	Cross short-horn	Aged	Mar. 1	1,087	18 1	8 8	15 3	9 7	14 14	8 12	14 3	8 15	15 8	8 13	14 2	8 14	14 6	9 7	169 1	24 3
4	Cross short-horn	Aged	April 15	1,180	17 5	13 7	17 12	12 0	18 0	13 2	19 7	11 6	19 8	11 14	20 8	11 10	20 1	11 8	217 8	31 1
5	Cross short-horn	6	Jan. 2	1,123	12 1	8 9	13 4	9 0	12 6	8 4	13 0	8 14	13 6	7 10	12 0	8 5	12 10	8 4	147 9	21 1
			Totals	5,395	85 13	55 6	85 8	52 11	84 2	54 1	83 14	53 7	88 4	51 12	84 1	50 8	88 2	53 12	971 5	—
			Means	1,079	17 3	11 1	17 2	10 9	16 13	10 13	16 12	10 11	17 10	10 6	16 13	10 1	17 10	10 12	194 4	27 12

Table X.—*continued.*

Detailed Record of Food consumed, and Milk yielded, by Cows fed on Unsewaged and Sewaged Meadow Grass, and on Italian Rye Grass (without Oilcake). Third Season, 1863; 7 days.—July 14 to July 20.

Five Cows.—Unsewaged Meadow Grass.

					Tuesday.		Wednesday.		Thursday.		Friday.		Saturday.		Sunday.		Monday.		Total in 7 days.	Per head per day.
Grass consumed. From which Field, Plot, and Crop					Five-acre, Plot 1, Crop 1.		Five-acre, Plot 1, Crop 1.		Five-acre, Plot 1, Crop 1.		Ten-acre, Plot 0*, Crop 1.		—		Five-acre, Plot 1, Crop 1.		Five-acre, Plot 1, Crop 1.		—	—
Quantities weighed (*tons. cwts. qrs. lbs.*)					0 2 0 5½		0 2 3 22½		0 2 1 1		0 5 1 14		—		0 3 1 6½		0 3 1 10		0 19 1 3½	0 0 2 6
Yield of Milk, &c. Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (July 20), *lbs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*
1	Cross short-horn	Aged	May 1	1,114	17 10	10 14	17 6	11 0	18 9	11 2	17 1	10 8	17 5	11 12	18 0	10 10	19 0	11 1	201 14	28 14
2	Cross short-horn	6	Feb. 15	1,226	12 12	8 0	13 6	8 3	13 8	8 1	12 10	7 3	12 3	8 1	14 7	7 2	14 10	8 2	148 4	21 3
3	Cross short-horn	3	April 13	830	12 6	8 14	12 15	8 15	13 0	7 3	12 4	7 4	12 2	8 4	12 5	7 0	13 11	7 14	144 1	20 9
4	Cross short-horn	8	May 20	1,092	22 0	14 10	22 3	15 0	22 8	15 8	21 7	15 0	22 0	14 1	21 5	14 6	23 7	10 5	253 12	36 4
5	Cross short-horn	7	April 17	1,142	17 3	11 1	16 12	11 8	17 6	9 12	17 0	10 8	16 15	11 8	13 1	10 0	19 0	14 10	201 4	28 12
			Totals	5,404	81 15	53 7	82 10	54 10	84 15	51 10	80 6	50 7	80 9	53 10	84 2	49 2	89 12	52 0	949 3	—
			Means	1,081	16 6	10 11	16 8	10 15	17 0	10 5	16 1	10 1	16 2	10 12	16 18	9 13	17 15	10 7	189 13	27 2

Ten Cows.—Sewaged Meadow Grass.

					Tuesday.		Wednesday.		Thursday.		Friday.		Saturday.		Sunday.		Monday.		Total in 7 days.	Per head per day.
Grass consumed. From which Field, Plot, and Crop					Five-acre, Plot 3, Crop 2.		Five-acre, Plot 2, Crop 2.		Five-acre, Plot 2, Crop 2.		Five-acre, Plot 2, Crop 2.		Five-acre, Plot 2, Crop 2,		Five-acre, Plot 2, Crop 2.		Five-acre, Plot 2, Crop 2.		—	—
Quantities weighed (*tons. cwts. qrs. lbs.*)					0 13 1 2		0 9 3 19		0 12 3 16		0 15 3 14		0 19 2 7		0 13 2 24		0 13 2 23		4 13 3 21	0 1 1 18
Yield of Milk, &c.																				
1	Cross short-horn	Aged	Mar. 10	1,154	18 2	11 6	17 0	11 3	16 14	11 10	16 4	12 4	15 12	12 4	16 6	11 10	17 8	9 8	197 11	28 4
2	Cross short horn	8	June 15	1,384	21 3	16 2	22 14	16 4	22 7	15 7	22 3	15 2	21 6	15 0	22 0	14 15	23 4	13 0	261 3	37 5
3	Cross short-horn	6	Feb. 20	1,146	13 12	10 1	14 8	10 12	14 6	10 14	14 8	10 4	14 8	10 4	14 6	11 4	14 5	10 5	174 1	24 14
4	Cross short-horn	7	Feb. 15	1,040	14 0	9 5	14 6	9 14	14 0	9 1	14 3	9 6	13 9	9 3	14 7	9 0	15 3	8 0	163 9	23 6
5	Ayrshire -	8	Feb. 22	1,029	13 10	10 0	13 10	9 6	13 12	10 2	14 10	10 1	13 10	9 2	15 4	9 6	15 6	8 6	166 5	23 12
6	Cross short-horn	6	April 14	1,016	17 4	10 12	17 10	10 8	17 11	11 9	18 2	10 9	17 4	12 2	18 0	11 0	19 2	10 7	202 0	28 14
7	Mongrel -	Aged	April 12	892	13 8	8 8	13 6	8 9	13 14	8 12	14 14	8 6	14 0	8 14	14 12	10 0	16 2	8 0	161 9	23 1
8	Cross short-horn	6	April 16	1,122	12 6	9 6	11 10	10 15	11 12	10 7	11 1	10 6	11 0	9 14	11 1	8 8	11 0	8 10	148 0	21 2
9	Cross short-horn	7	April 13	1,016	14 7	11 10	16 0	11 0	15 0	13 0	14 6	9 0	15 6	10 5	14 10	11 2	18 4	9 0	183 2	25 3
10	Half short-horn	8	April 25	1,226	20 0	15 10	20 4	15 1	20 0	13 14	22 4	14 5	21 2	14 0	21 6	12 4	22 3	12 4	244 9	34 15
			Totals	11,055	158 4	112 12	161 4	113 8	159 12	114 12	162 7	109 11	157 9	111 0	162 4	109 1	172 5	97 8	1,902 1	—
			Means	1,106	15 13	11 4	16 2	11 6	16 0	11 8	16 4	10 15	15 12	11 1	16 4	10 14	17 4	9 12	190 3	27 3

Five Cows.—Unsewaged or Sewaged Italian Rye Grass.

					Tuesday.		Wednesday.		Thursday.		Friday.		Saturday.		Sunday.		Monday.		Total in 7 days.	Per head per day.
Grass consumed. From which Field, Plot, and Crop					Rye, Plot 2, Crop 3.		Rye, Plot 2, Crop 3.		Rye, Plot 2, Crop 3.		Rye, Plot 2, Crop 3.		Rye, Plot 2, Crop 3.		Rye, Plot 2, Crop 3.		Rye, Plot 2, Crop 3.		—	—
Quantities weighed (*tons. cwts. qrs. lbs.*)					0 10 0 5		0 8 1 23		0 7 0 12		0 7 0 0		0 10 0 21		0 6 1 23		0 6 2 0		2 15 3 0	0 1 2 10
Yield of Milk, &c.																				
1	Cross short-horn	Aged	April 20	1,140	21 9	13 2	22 3	13 11	21 6	13 11	21 8	13 2	20 3	13 9	21 0	13 1	21 1	11 12	243 14	34 13
2	Ayrshire -	6	Mar. 15	910	16 7	11 0	16 15	11 3	16 12	10 3	17 0	10 14	16 10	10 14	18 2	9 4	17 0	10 8	192 12	27 9
3	Cross short-horn	Aged	Mar. 1	1,130	15 0	8 10	14 14	9 2	14 12	9 0	15 0	8 4	14 11	9 0	14 12	8 10	15 8	7 15	165 2	23 9
4	Cross short-horn	Aged	April 15	1,218	18 6	12 1	19 0	12 1	18 12	11 6	20 1	11 15	18 9	12 4	19 2	11 4	18 2	12 8	215 7	30 12
5	Cross short-horn	6	Jan. 2	1,184	12 0	7 15	12 4	8 13	12 1	7 6	12 4	7 6	12 0	7 6	12 2	8 8	11 14	7 0	138 15	19 14
			[illegible]	[illegible]	[illegible]	[illegible]	95 4	54 14	83 11	51 10	85 13	51 9	82 1	53 1	85 2	50 11	86 9	49 11	956 2	—

… and Milk yielded, by Cows fed on Unsewaged and Sewaged Meadow Grass, and on Italian Rye Grass, with Oilcake in addition.
Third Season, 1863; 7 days.—July 21 to July 27.

FIVE COWS.—UNSEWAGED MEADOW GRASS.

Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (July 20) lbs.	Tuesday. A.M.	Tuesday. P.M.	Wednesday. A.M.	Wednesday. P.M.	Thursday. A.M.	Thursday. P.M.	Friday. A.M.	Friday. P.M.	Saturday. A.M.	Saturday. P.M.	Sunday. A.M.	Sunday. P.M.	Monday. A.M.	Monday. P.M.	Total in 7 days.	Per head per day.
Food consumed. Grass: From which Field, Plot, and Crop					Five-acre, Plot 1, Crop 1.		Ten-acre, Plot 0*, Crop 1.		Ten-acre, Plot 0*, Crop 1.		Ten-acre, Plot 0*, Crop 1.		Ten-acre, Plot 0*, Crop 1.		Ten-acre, Plot 0*, Crop 1.		Ten-acre, Plot 0*, Crop 1.		—	—
Quantities weighed (tons. cwts. qrs. lbs.)					0 2 3 3½		0 3 2 1		0 2 2 7½		0 4 0 27		0 1 3 9½		0 2 3 20½		0 2 3 24		1 0 3 0	0 0 2 11
Oilcake (cotton-cake) (ditto)					0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 3 21	0 0 0 3
Yield of Milk, &c.					lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.
1	Cross short-horn	Aged	May 1	1,114	17 4	12 12	18 5	16 0	19 1	11 14	19 0	10 12	19 12	11 2	19 4	12 0	21 10	12 3	220 15	31 9
2	Cross short-horn	6	Feb. 15	1,226	12 12	8 10	14 4	9 1	13 7	8 4	13 14	8 8	14 4	8 4	14 0	8 9	14 11	8 3	156 11	22 6
3	Cross short-horn	3	April 13	830	12 12	8 6	13 10	9 7	12 12	8 9	14 0	8 9	13 12	8 4	14 12	8 8	15 6	7 15	156 10	22 6
4	Cross short-horn	3	May 20	1,092	21 4	15 3	24 10	18 1	22 12	15 10	24 2	14 15	24 10	14 2	22 12	16 2	25 6	14 14	274 7	39 3
5	Cross short-horn	7	April 17	1,142	17 9	12 4	19 14	10 15	17 11	10 6	17 10	10 15	17 14	11 1	18 8	9 12	19 8	11 2	205 1	29 5
			Totals	5,404	81 9	57 3	90 11	63 8	85 11	54 11	88 10	53 11	90 4	52 13	89 4	54 15	96 9	54 5	1,013 12	—
			Means	1,081	16 5	11 7	18 2	12 11	17 2	10 15	17 11	10 12	18 1	10 9	17 14	11 0	19 5	10 14	202 12	28 15

TEN COWS.—SEWAGED MEADOW GRASS.

Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (July 20) lbs.	Tuesday. A.M.	Tuesday. P.M.	Wednesday. A.M.	Wednesday. P.M.	Thursday. A.M.	Thursday. P.M.	Friday. A.M.	Friday. P.M.	Saturday. A.M.	Saturday. P.M.	Sunday. A.M.	Sunday. P.M.	Monday. A.M.	Monday. P.M.	Total in 7 days.	Per head per day.
Food consumed. Grass: From which Field, Plot, and Crop					Five-acre, Plot 2, Crop 2.		Ten-acre, Plot 00*, Crop 2.		Ten-acre, Plot 2, Crop 2.		Ten-acre, Plot 2, Crop 2.		Ten-acre, Plot 2, Crop 2.		Ten-acre. Plot 2, Crop 2.		Ten-acre, Plot 2, Crop 2.		—	—
Quantities weighed (tons. cwts. qrs. lbs.)					1 4 0 17		0 11 0 9		0 5 2 11		0 14 2 7		0 13 1 26		0 14 0 17		0 14 0 22		4 18 0 25	0 1 1 17
Oilcake (cotton-cake) (ditto)					0 0 1 2		0 0 1 2		0 0 1 2		0 0 1 2		0 0 1 2		0 0 1 2		0 0 1 2		0 1 3 14	0 0 0 3
1	Cross short-horn	Aged	Mar. 10	1,154	14 11	13 8	18 2	15 1	16 7	12 8	16 12	13 2	16 14	12 4	17 6	13 12	18 0	13 4	211 11	30 4
2	Cross short horn	8	June 15	1,384	21 0	16 0	23 11	16 2	22 8	15 0	22 0	14 11	22 2	14 5	23 2	15 0	24 6	13 13	263 12	37 11
3	Cross short-horn	6	Feb. 20	1,146	13 10	12 6	13 14	11 3	13 15	11 4	13 6	11 0	13 8	11 2	14 2	10 4	14 0	10 11	174 5	24 14
4	Cross short-horn	7	Feb. 15	1,040	13 6	10 4	16 8	10 12	14 10	10 2	14 11	9 2	15 8	9 0	15 10	9 14	15 8	8 6	173 5	24 12
5	Ayrshire	8	Feb. 22	1,029	13 0	10 8	15 7	11 0	14 8	9 11	14 15	10 4	15 4	9 6	15 7	9 0	15 12	9 4	173 6	24 12
6	Cross short-horn	6	April 14	1,016	17 2	12 9	20 13	12 15	18 12	11 12	19 2	11 10	20 2	11 7	20 0	11 10	21 2	12 0	221 6	31 10
7	Mongrel	Aged	April 13	892	13 2	11 11	17 6	10 11	14 6	9 10	15 1	9 6	14 10	9 10	15 6	9 6	16 10	8 15	175 14	25 2
8	Cross short-horn	6	April 16	1,122	10 8	11 0	11 15	10 13	11 12	10 1	11 10	0 0	13 0	10 2	12 8	10 8	12 4	8 6	153 7	21 15
9	Cross short-horn	7	April 13	1,046	15 6	13 8	18 1	14 12	17 5	12 8	16 8	12 14	20 0	12 6	18 6	13 7	20 6	14 6	219 13	31 6
10	Half short-horn	8	April 25	1,226	20 5	15 10	21 4	13 3	23 4	15 7	23 10	15 2	22 9	16 10	24 2	15 8	25 8	14 10	266 12	38 2
			Totals	11,055	152 2	127 0	177 1	126 8	167 7	117 15	167 11	116 3	173 9	116 4	176 7	118 5	183 8	113 11	2,083 11	—
			Means	1,106	15 3	12 11	17 11	12 11	16 12	11 13	16 12	11 10	17 6	11 10	17 10	11 13	18 6	11 6	203 6	29 1

FIVE COWS.—UNSEWAGED OR SEWAGED ITALIAN RYE GRASS.

Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (July 20) lbs.	Tuesday. A.M.	Tuesday. P.M.	Wednesday. A.M.	Wednesday. P.M.	Thursday. A.M.	Thursday. P.M.	Friday. A.M.	Friday. P.M.	Saturday. A.M.	Saturday. P.M.	Sunday. A.M.	Sunday. P.M.	Monday. A.M.	Monday. P.M.	Total in 7 days.	Per head per day.
Food consumed. Grass: From which Field, Plot, and Crop					Rye, Plot 2, Crop 3.		Rye, Plot 2, Crop 3.		Rye, Plot 2, Crop 3.		Rye, Plot 2, Crop 3.		Rye, Plot 2, Crop 3.		Rye, Plot 2, Crop 3.		Rye, Plot 2, Crop 3.		—	—
Quantities weighed (tons. cwts. qrs. lbs.)					0 6 3 3		0 7 0 9		0 10 1 23		0 5 2 24		0 7 0 11		0 6 3 7		0 0 3 8		2 10 3 1	0 1 1 22
Oilcake (cotton-cake) (ditto)					0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 3 21	0 0 0 3
1	Cross short-horn	Aged	April 20	1,140	20 1	13 12	25 2	14 14	22 8	13 10	22 8	12 5	23 13	13 14	22 8	14 10	22 10	16 0	258 3	36 14
2	Ayrshire	6	Mar. 15	910	16 3	11 0	16 8	11 2	16 4	11 6	15 10	10 7	17 0	10 11	17 12	10 12	19 0	10 7	194 2	27 12
3	Cross short-horn	Aged	Mar. 1	1,130	14 0	9 6	16 1	9 5	14 8	9 0	13 11	8 11	16 0	9 3	15 2	9 10	15 3	8 12	168 8	24 1
4	Cross short-horn	Aged	April 15	1,218	16 3	12 13	19 0	13 14	18 1	12 12	21 0	10 6	19 0	11 9	20 2	12 8	23 12	12 10	223 10	31 15
5	Cross short-horn	6	Jan. 2	1,184	11 10	7 13	13 15	8 4	12 11	7 8	12 8	8 7	13 4	7 13	13 6	8 2	12 5	9 12	147 6	21 1
			Totals	5,582	78 1	54 12	90 10	57 7	84 0	54 4	85 5	50 4	89 1	53 2	88 14	55 10	92 14	57 9	991 13	—
			Means	1,116	15 10	10 15	18 2	11 8	16 13	10 14	17 1	10 1	17 13	10 10	17 12	11 2	18 9	11 8	198 6	28 5

* Unmeasured land; designated Plot 0 when unsewaged, and Plot 00 when sewaged.

Table X.—*continued.*

Detailed Record of Food consumed, and Milk yielded, by Cows fed on Unsewaged and Sewaged Meadow Grass, and on Italian Rye Grass, with Oilcake in addition.
Third Season, 1863; 7 days.—July 28 to August 3.

Five Cows.—Unsewaged Meadow Grass. a

					Tuesday.		Wednesday.		Thursday.		Friday.		Saturday.		Sunday.		Monday.		Total in 7 days.	Per head per day.
Food consumed. Grass	From which Field, Plot, and Crop				Five-acre, Plot 1, Crop 1.		—		Five-acre, Plot 0*, Crop 1.		Ten-acre, Plot 0*, Crop 1.		Ten-acre, Plot 0*, Crop 1.		Rye, Plot 1, Crop 3.		Rye, Plot 1, Crop 3.		—	—
	Quantities weighed (*tons cwts. qrs. lbs.*)				0 3 3 13½		—		0 1 2 13		0 2 3 1½		0 3 1 6½		0 2 2 19½		0 2 2 21		0 16 3 19	0 0 1 26
Oilcake (cotton-cake)	(*ditto*)				0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 3 21	0 0 0 3
Yield of Milk, &c. Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (July 20) *lbs.*	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	—	—
					lbs. ozs.	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*
1	Cross short-horn	Aged	May 1	1,138†	20 6	13 2	20 10	12 9	20 4	11 13	20 11	13 1	21 10	13 1	20 12	13 3	21 5	14 6	236 13	33 13
2	Cross short-horn	6	Feb. 15	1,234†	13 10	9 2	14 2	8 6	13 11	8 3	13 10	8 2	13 8	8 9	12 10	8 8	15 8	8 11	156 4	22 5
3	Cross short-horn	3	April 13	854†	15 8	9 11	16 2	9 4	14 14	8 4	15 0	9 10	14 10	10 7	16 1	9 10	14 5	7 8	170 14	24 7
4	Cross short-horn	8	May 20	1,118†	24 4	16 0	25 4	15 8	23 7	15 6	24 8	14 14	25 0	16 2	23 4	16 1	23 8	13 12	276 14	39 9
5	Cross short-horn	7	April 17	1,170†	19 0	11 2	18 13	10 13	17 6	10 10	17 6	11 5	17 2	9 10	17 8	11 3	17 3	10 2	199 3	28 7
			Totals	5,514	92 12	59 1	94 15	56 8	89 10	54 4	91 3	57 0	91 14	57 13	90 3	58 9	91 13	54 7	1,040 0	—
			Means	1,103	18 9	11 13	19 0	11 5	17 15	10 13	18 4	11 6	18 6	11 9	18 1	11 11	18 6	10 14	208 0	29 11

Ten Cows.—Sewaged Meadow Grass.

					Tuesday.		Wednesday.		Thursday.		Friday.		Saturday.		Sunday.		Monday.		Total in 7 days.	Per head per day.
Food consumed. Grass	From which Field, Plot, and Crop				Five-acre, Plot 2, Crop 2.		Ten-acre, Plot 2, Crop 2.		Ten-acre, Plot 2, Crop 2.		Five-acre, Plot 00*, Crop 2.		Ten-acre, Plot 4, Crop 3.		Five-acre, Plot 4, Crop 3.		Five-acre, Plot 4, Crop 3.		—	—
	Quantities weighed (*tons. cwts. qrs. lbs.*)				0 14 3 15		0 18 0 9		1 1 0 23		0 16 3 5‡		0 9 3 12		0 15 2 4		0 15 2 9		5 11 3 21	0 1 2 11
Oilcake (cotton-cake)	(*ditto*)				0 0 1 2		0 0 1 2		0 0 1 2		0 0 1 2		0 0 1 2		0 0 1 2		0 0 1 2		0 1 3 14	0 0 0 3
Yield of Milk, &c.					A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.		
1	Cross short-horn	Aged	Mar. 10	1,154	17 0	14 6	17 11	14 0	17 12	12 10	16 6	13 10	18 0	13 12	18 9	12 13	18 8	11 10	216 11	30 15
2	Cross short-horn	8	June 15	1,384	21 10	16 1	24 0	16 7	22 12	15 9	22 4	16 1	23 2	15 14	23 9	15 13	23 12	16 2	273 0	39 0
3	Cross short-horn	6	Feb. 20	1,146	13 6	12 3	14 12	10 5	14 5	10 13	13 14	11 0	13 12	12 1	14 0	9 8	13 11	10 9	174 3	24 14
4	Cross short-horn	7	Feb. 15	1,040	14 0	10 2	15 6	9 4	14 13	9 2	14 4	10 14	15 12	9 12	14 13	10 1	16 14	9 12	174 13	25 0
5	Ayrshire – –	8	Feb. 22	1,029	14 6	10 12	15 4	8 9	14 6	9 7	15 5	10 6	15 0	10 5	14 6	9 1	14 12	8 15	170 14	24 7
6	Cross short-horn	6	April 14	1,016	19 4	12 5	21 0	11 3	20 0	11 8	19 7	13 0	21 2	12 0	19 3	12 3	20 6	12 0	224 9	32 1
7	Mongrel – –	Aged	April 12	892	14 0	10 9	16 0	9 9	15 12	9 5	15 2	10 12	15 8	10 14	16 4	9 6	15 3	7 14	176 2	25 3
8	Cross short-horn	6	April 16	1,122	11 10	11 3	11 7	10 5	12 4	10 1	13 4	10 4	14 12	9 14	14 12	9 15	12 10	10 10	162 15	23 4
9	Cross short-horn	7	April 13	1,046	19 0	13 6	19 4	16 0	19 0	13 3	18 12	13 0	21 0	9 12	19 8	12 7	18 6	11 5	223 15	32 0
10	Half short-horn	8	April 25	1,226	22 0	17 14	24 3	14 9	23 10	15 2	21 8	16 11	23 4	15 12	23 12	15 11	25 0	13 2	272 2	38 14
			Totals	11,055	166 4	128 13	178 15	120 3	174 10	116 12	170 2	125 10	181 4	120 0	178 12	116 14	179 2	111 15	2,069 4	—
			Means	1,106	16 10	12 14	17 14	12 0	17 8	11 11	17 0	12 9	18 2	12 0	17 14	11 11	17 15	11 3	206 15	29 9

Five Cows.—Unsewaged or Sewaged Italian Rye Grass.

					Tuesday.		Wednesday.		Thursday.		Friday.		Saturday.		Sunday.		Monday.		Total in 7 days.	Per head per day.
Food consumed. Grass	From which Field, Plot, and Crop				Rye, Plot 2, Crop 3.		Rye, Plot 3, Crop 4.		Rye, Plot 3, Crop 4.		Rye, Plot 3, Crop 4.		Rye, Plot 3, Crop 4.		Rye, Plot 3, Crop 4.		Rye, Plot 3, Crop 4.		—	—
	Quantities weighed (*tons. cwts. qrs. lbs.*)				0 7 0 1		0 8 3 15§		0 7 1 23		0 9 1 1		0 7 2 0		0 4 0 23		0 4 1 0		2 8 2 7	0 1 1 15
Oilcake (cotton-cake)	(*ditto*)				0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 3 21	0 0 0 3
Yield of Milk, &c.					A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.		
1	Cross short-horn	Aged	April 20	1,140	21 2	16 5	22 0	13 2	21 12	13 14	22 2	14 0	22 6	12 0	22 0	15 6	21 7	12 3	249 11	35 11
2	Ayrshire – –	6	Mar. 15	910	18 4	10 11	18 4	9 12	17 11	10 4	17 1	10 10	17 3	9 12	18 5	10 15	18 0	9 10	196 6	28 1
3	Cross short-horn	Aged	Mar. 1	1,130	15 8	9 12	15 2	9 5	15 8	9 5	15 9	9 3	16 6	9 0	14 8	10 9	15 6	9 0	174 1	24 14
4	Cross short-horn	Aged	April 15	1,218	16 10	13 7	19 3	10 0	19 1	11 13	20 15	12 12	20 12	12 10	21 9	13 1	19 2	12 14	223 13	31 15
5	Cross short-horn	6	Jan. 2	1,184	12 10	8 14	12 7	8 2	12 0	8 4	12 3	9 8	12 1	7 8	11 14	8 9	11 10	8 0	143 10	20 8
			Totals	5,582	84 2	59 1	87 0	50 5	86 0	53 8	87 14	56 1	88 12	50 14	88 4	58 8	85 9	51 11	987 9	—
			Means	1,116	16 13	11 13	17 6	10 1	17 3	10 11	17 9	11 4	17 12	10 3	17 10	11 11	17 2	10 6	197 8	28 3

Detailed Record of Food consumed, and Milk yielded, by Cows fed on Unsewaged and Sewaged Meadow Grass, and on Italian Rye Grass, with Oilcake in addition.
Third Season, 1863; 7 days.—August 4 to August 10.

Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (July 20) lbs.	Tuesday. A.M.	Tuesday. P.M.	Wednesday. A.M.	Wednesday. P.M.	Thursday. A.M.	Thursday. P.M.	Friday. A.M.	Friday. P.M.	Saturday. A.M.	Saturday. P.M.	Sunday. A.M.	Sunday. P.M.	Monday. A.M.	Monday. P.M.	Total in 7 days.	Per head per day.
FIVE COWS.—UNSEWAGED MEADOW GRASS. *a*																				
Food consumed. Grass: From which Field, Plot, and Crop					Rye, Plot 1, Crop 3.		Rye, Plot 1, Crop 3.		Rye, Plot 1, Crop 3.		Rye, Plot 1, Crop 3.		Rye, Plot 1, Crop 3.		Rye, Plot 1, Crop 3.		Rye, Plot 1, Crop 3.		—	—
Grass: Quantities weighed (*tons. cwts. qrs. lbs.*)					0 5 3 17½		0 5 0 4½		0 1 1 2½		0 4 1 10		0 3 2 10½		0 3 2 4½		0 3 2 8		1 7 1 1½	0 0 3 3
Oilcake (cotton-cake) – (*ditto*)					0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 3 21	0 0 0 3
Yield of Milk, &c.					*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*
1	Cross short-horn	Aged	May 1	1,138*	18 0	12 12	18 12	13 8	21 10	14 0	20 13	13 8	21 15	14 4	21 10	12 13	23 0	14 1	240 5	34 5
2	Cross short-horn	6	Feb. 15	1,234*	14 3	9 0	13 11	8 6	14 4	9 0	14 0	8 0	12 10	8 10	13 8	7 3	12 6	8 9	153 6	21 15
3	Cross short-horn	3	April 13	854*	16 1	10 8	15 6	9 13	16 11	9 10	16 2	9 12	15 10	10 13	15 10	8 11	15 5	9 1	179 1	25 9
4	Cross short-horn	8	May 20	1,118*	26 1	16 4	24 15	16 4	26 12	15 12	26 4	14 9	23 11	15 8	26 13	14 0	25 0	15 14	287 11	41 2
5	Cross short-horn	7	April 17	1,170*	17 11	12 8	18 14	10 8	13 12	11 6	18 10	11 0	17 0	12 7	17 8	10 12	19 1	10 11	206 12	29 8
			Totals	5,514	92 0	61 0	91 10	58 7	98 1	59 12	95 13	56 8	90 14	61 10	95 1	53 7	94 12	58 4	1,067 3	—
			Means	1,103	18 6	12 3	18 5	11 11	19 10	11 15	19 3	11 5	18 3	12 5	19 0	10 11	18 15	11 11	213 7	30 8
TEN COWS.—SEWAGED MEADOW GRASS.																				
Food consumed. Grass: From which Field, Plot, and Crop					Five-acre, Plot 4, Crop 3.		Five-acre, Plot 4, Crop 3.		Five-acre, Plot 4, Crop 3.		Five-acre, Plot 4, Crop 3.		Ten-acre, Plot 4, Crop 3.		Five-acre, Plot 3, Crop 3.		Five-acre, Plot 3, Crop 3.		—	—
Grass: Quantities weighed (*tons. cwts. qrs. lbs.*)					0 18 0 3		0 15 0 2		0 19 1 16		0 19 0 14		0 15 1 23		0 15 0 14		0 15 0 16		5 17 1 4	0 1 2 20
Oilcake (cotton-cake) – (*ditto*)					0 0 1 2		0 0 1 2		0 0 1 2		0 0 1 2		0 0 1 2		0 0 1 2		0 0 1 2		0 1 3 14	0 0 0 3
1	Cross short-horn	Aged	Mar. 10	1,154	17 10	12 12	17 14	13 9	18 3	12 10	17 12	12 9	17 0	13 14	17 6	11 4	17 8	12 13	212 12	30 6
2	Cross short horn	8	June 15	1,384	22 11	15 8	22 3	16 0	21 12	15 11	21 0	15 10	22 4	15 3	21 8	13 0	21 12	14 3	258 5	36 14
3	Cross short-horn	6	Feb. 20	1,146	13 10	10 6	13 4	11 1	12 14	11 0	13 8	10 0	13 12	10 1	13 10	9 2	14 7	9 14	166 9	23 13
4	Cross short-horn	7	Feb. 15	1,040	15 11	10 0	16 0	11 5	16 8	11 11	15 12	11 6	16 1	9 13	15 0	9 8	15 6	9 10	183 11	26 4
5	Ayrshire – –	8	Feb. 22	1,029	14 0	8 15	14 1	9 2	14 6	9 12	14 14	9 8	14 4	8 6	14 0	7 14	14 10	8 9	162 5	23 3
6	Cross short-horn	6	April 14	1,016	20 1	11 7	19 2	11 3	20 4	12 0	19 14	11 10	19 2	11 4	19 10	10 0	20 2	11 14	217 9	31 1
7	Mongrel – –	Aged	April 12	892	14 6	8 14	14 12	9 11	15 12	8 10	15 7	8 14	15 10	9 0	15 0	8 7	16 0	8 9	169 0	24 2
8	Cross short-horn	6	April 16	1,122	12 0	9 3	12 2	9 6	11 0	10 8	11 9	9 14	11 10	9 10	12 2	9 0	12 0	11 5	151 5	21 10
9	Cross short-horn	7	April 13	1,046	17 4	14 2	17 9	12 12	15 4	10 6	15 6	13 0	15 0	15 14	17 2	10 3	18 14	11 0	203 12	29 2
10	Half short-horn	8	April 25	1,226	22 8	15 12	21 3	16 3	25 6	15 0	23 15	15 0	23 12	14 15	25 0	14 12	22 4	14 9	270 3	38 10
			Totals	11,055	169 13	116 15	163 2	120 4	171 5	117 4	169 1	117 7	168 7	118 0	170 6	103 2	172 15	112 6	1,995 7	—
			Means	1,106	17 0	11 11	16 13	12 0	17 2	11 12	16 14	11 12	16 13	11 13	17 1	10 5	17 5	11 4	199 9	23 8
FIVE COWS.—SEWAGED OR UNSEWAGED ITALIAN RYE GRASS.																				
Food consumed. Grass: From which Field, Plot, and Crop					Rye, Plot 3, Crop 4.		Rye, Plot 3, Crop 4.		Rye, Plot 3, Crop 4.		Rye, Plot 3, Crop 4.		Rye, Plot 3, Crop 4.		Rye, Plot 3, Crop 4.		Rye, Plot 3, Crop 4.		—	—
Grass: Quantities weighed (*tons. cwts. qrs. lbs.*)					0 4 3 25		0 8 3 25		0 5 2 17		0 6 2 22		0 5 2 23		0 4 3 21		0 4 3 26		2 1 3 19	0 1 0 22
Oilcake (cotton-cake) – (*ditto*)					0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 3 21	0 0 0 3
1	Cross short-horn	Aged	April 20	1,140	21 8	15 6	22 10	14 8	21 10	13 4	23 2	12 10	24 0	12 8	13 11	13 4	23 10	13 10	245 5	35 1
2	Ayrshire – –	6	Mar. 15	910	16 11	11 9	18 3	10 14	18 3	10 11	17 6	9 6	16 8	9 8	23 13	10 3	20 0	11 10	204 9	29 4
3	Cross short-horn	Aged	Mar. 1	1,130	15 12	10 7	16 0	10 0	16 1	9 1	14 1	3 10	14 0	9 3	13 11	10 12	17 1	9 6	174 1	24 14
4	Cross short-horn	Aged	April 15	1,218	21 2	14 12	21 3	13 13	21 13	12 4	21 4	13 0	20 14	13 10	21 8	11 15	24 5	12 14	244 5	34 14
5	Cross short-horn	6	Jan. 2	1,184	12 7	6 0	9 0	7 4	11 6	7 14	12 14	7 2	11 12	8 10	11 10	8 10	13 4	7 13	135 10	19 6
			Totals	5,582	87 8	58 2	87 0	56 7	89 1	53 2	88 11	50 12	87 2	53 7	84 5	54 12	98 4	55 5	1,003 14	—
			Means	1,116	17 8	11 10	17 6	11 5	17 13	10 10	17 12	10 2	17 7	10 11	16 14	10 15	19 10	11 1	200 12	28 11

* In these cases the weights recorded are of an intermediate weighing taken on August 3.
a. Other grass was given when unsewaged meadow grass was not available.

Table X.—*continued.*

Detailed Record of Food consumed, and Milk yielded, by Cows fed on Unsewaged and Sewaged Meadow Grass, and on Italian Rye Grass, with Oilcake in addition.
Third Season, 1863; 7 days.—August 11 to August 17.

Five Cows.—Unsewaged Meadow Grass. *a*

					Tuesday.		Wednesday.		Thursday.		Friday.		Saturday.		Sunday.		Monday.		Total in 7 days.	Per head per day.
Food consumed. Grass	From which Field, Plot, and Crop				Rye, Plot 1, Crop 3.		Rye, Plot 1, Crop 3.		Rye, Crop 3*.		Rye, Crop 3*.		Rye, Crop 3*.		Rye, Crop 3*.		Rye, Crop 3*.		—	—
	Quantities weighed (*tons. cwts. qrs. lbs.*)				0 3 2 9½		0 2 1 17½		0 2 0 23		0 3 1 10		0 3 2 4		0 2 1 16		0 2 1 17		0 19 3 13	0 0 2 8
Oilcake (cotton-cake)	(*ditto*)				0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 3 21	0 0 0 3
Yield of Milk, &c. Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (Aug. 17) *lbs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*
1	Cross short-horn	Aged	May 1	1,176	20 3	14 7	20 10	14 2	22 0	13 0	21 12	15 3	21 14	13 4	20 10	13 8	22 0	13 6	245 15	35 2
2	Cross short-horn	6	Feb. 15	1,253	13 0	8 2	12 13	7 14	14 0	8 0	13 8	7 14	12 12	8 6	13 0	7 0	15 2	7 7	148 14	21 4
3	Cross short-horn	8	April 13	878	15 8	9 10	16 0	9 8	15 14	10 4	16 1	9 15	16 0	9 8	16 2	9 1	16 8	8 12	178 11	25 8
4	Cross short-horn	8	May 20	1,118	25 10	16 6	24 2	15 12	25 15	15 7	25 8	16 4	25 8	14 3	25 1	14 0	27 10	14 4	285 10	40 13
5	Cross short-horn	7	April 17	1,194	17 7	11 0	18 2	12 0	18 1	11 6	17 13	11 13	17 6	11 0	17 2	11 4	19 4	12 6	206 0	29 7
			Totals	5,619	91 12	59 9	91 11	59 4	95 14	58 1	94 10	61 1	93 8	56 5	91 15	54 13	100 8	56 3	1,065 2	—
			Means	1,124	18 6	11 15	18 5	11 13	19 3	11 10	18 15	12 3	18 11	11 4	18 0	10 15	20 2	11 4	213 0	30 7

Ten Cows.—Sewaged Meadow Grass.

					Tuesday.		Wednesday.		Thursday.		Friday.		Saturday.		Sunday.		Monday.		Total in 7 days.	Per head per day.
Food consumed. Grass	From which Field, Plot, and Crop				Five-acre, Plot 3, Crop 3.		Ten-acre, Plot 4, Crop 3.		Ten-acre, Plot 4, Crop 3.		Five-acre, Plot 4, Crop 3.		Five-acre, Plot 4, Crop 3.		Five-acre, Plot 3, Crop 3.		Five-acre, Plot 3, Crop 3.		—	—
	Quantities weighed (*tons. cwts. qrs. lbs.*)				1 1 3 13		0 14 3 1		0 13 3 14		0 16 1 20		0 18 3 14		0 12 0 4		0 12 0 5		5 9 3 15	0 1 2 8
Oilcake (cotton-cake)	(*ditto*)				0 0 1 2		0 0 1 2		0 0 1 2		0 0 1 2		0 0 1 2		0 0 1 2		0 0 1 2		0 1 3 14	0 0 0 3
1	Cross short-horn	Aged	Mar. 10	1,182	17 0	13 2	17 0	11 4	16 11	11 10	17 10	12 15	16 12	11 6	16 0	11 0	18 2	11 12	202 4	28 14
2	Cross short-horn	8	June 15	1,384	21 2	13 9	20 7	13 5	21 4	14 4	22 1	14 14	21 2	13 8	20 8	13 6	22 6	13 2	244 14	35 0
3	Cross short-horn	6	Feb. 20	1,182	12 14	10 0	13 4	9 10	13 0	9 12	12 13	10 2	13 0	10 3	13 12	9 1	13 12	9 12	160 15	23 0
4	Cross short-horn	7	Feb. 15	1,070	14 11	10 0	14 0	9 2	13 10	9 10	13 8	10 8	13 12	9 7	14 0	8 6	15 10	9 9	165 13	23 11
5	Ayrshire - -	8	Feb. 22	1,019	13 6	8 11	13 1	6 10	12 0	8 2	11 6	7 14	11 0	8 5	11 2	7 0	12 0	3 0	133 15	19 14
6	Cross short-horn	6	April 14	1,043	19 4	11 3	19 0	10 10	19 1	10 11	19 12	12 3	19 7	11 3	13 8	10 2	20 6	10 14	212 4	30 5
7	Mongrel - -	Aged	April 12	884	15 0	8 5	15 2	8 4	14 2	9 0	14 0	9 4	15 8	8 2	14 10	8 3	17 1	9 0	105 15	23 11
8	Cross short-horn	6	April 16	1,140	11 10	9 1	11 12	9 0	11 0	9 4	10 8	10 8	12 11	10 0	12 0	9 4	12 8	10 6	149 14	21 7
9	Cross short-horn	7	April 18	1,040	16 1	12 3	16 3	12 10	18 2	10 12	17 10	14 11	18 14	11 15	19 10	10 7	19 0	12 9	210 11	30 1
10	Half short-horn	8	April 25	1,260	24 4	14 3	23 0	14 4	22 6	15 4	22 2	15 7	23 0	13 6	22 2	13 4	23 10	15 4	261 8	37 6
			Totals	11,209	165 4	110 5	162 13	105 1	161 4	108 5	161 0	118 6	165 8	107 7	162 4	100 1	174 7	110 10	1,913 1	—
			Means	1,121	16 8	11 1	16 5	10 8	16 2	10 13	16 2	11 13	16 9	10 12	16 4	10 0	17 7	11 1	191 5	27 5

Five Cows.—Unsewaged or Sewaged Italian Rye Grass.

					Tuesday.		Wednesday.		Thursday.		Friday.		Saturday.		Sunday.		Monday.		Total in 7 days.	Per head per day.
Food consumed. Grass	From which Field, Plot, and Crop				Rye Plots 2 & 3, Crop 4.		Rye, Plot 2, Crop 4.		Rye, Plot 2, Crop 4, & Plot 0†, Crop 3.		Rye, Plot 0†, Crop 3.		Rye, Plot 0†, Crop 3.		Rye, Plot 0†, Crop 3.		Rye, Plot 0†, Crop 3,		—	—
	Quantities weighed (*tons. cwts. qrs. lbs.*)				0 7 1 9		0 4 1 11		0 4 2 2½		0 4 1 25½		0 0 1 17½		0 2 2 19½		0 2 2 22		1 12 1 23	0 0 3 20
Oilcake (cotton-cake)	(*ditto*)				0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 3 21	0 0 0 3
1	Cross short-horn	Aged	April 20	1,150	23 12	14 12	25 11	14 0	24 0	13 2	23 10	14 1	22 4	12 8	20 9	13 7	23 8	11 4	256 14	36 11
2	Ayrshire - -	6	Mar. 15	922	19 10	11 6	18 8	12 7	17 10	11 8	17 12	12 0	17 4	10 13	10 14	11 12	18 6	9 9	205 7	29 6
3	Cross short-horn	Aged	Mar. 1	1,146	16 8	0 12	16 10	9 7	16 1	9 7	14 4	4 10	15 8	7 7	15 12	9 2	15 14	8 4	167 10	23 15
4	Cross short-horn	Aged	April 15	1,271	21 12	14 8	21 14	13 2	20 15	13 7	20 4	13 0	20 0	13 11	20 6	14 8	18 12	10 11	236 14	33 13
5	Cross short-horn	6	Jan. 2	1,195	12 10	7 3	12 7	8 0	13 0	7 0	12 12	3 0	13 12	7 5	13 7	8 1	14 15	8 0	146 14	21 0
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	54 8	88 10	51 11	88 12	51 12	87 0	56 14	91 7	47 12	1,013 11	—

Detailed Record of Food consumed, and Milk yielded, by Cows fed on Unsewaged and Sewaged Meadow Grass, and on Italian Rye Grass, with Oilcake in addition.
Third Season, 1863; 7 days.—August 18 to August 24.

Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (Aug. 17) lbs.	Tuesday. A.M.	Tuesday. P.M.	Wednesday. A.M.	Wednesday. P.M.	Thursday. A.M.	Thursday. P.M.	Friday. A.M.	Friday. P.M.	Saturday. A.M.	Saturday. P.M.	Sunday. A.M.	Sunday. P.M.	Monday. A.M.	Monday. P.M.	Total in 7 days.	Per head per day.
Five Cows.—Unsewaged Meadow Grass. *a*																				
Food consumed. Grass: From which Field, Plot, and Crop					* Rye, Crop 3.		* Rys, Crop 3.		* Rye, Crop 3.		* Rye, Crop 3.		* Rye, Crop 3.		* Rye, Crop 3.		* Rye, Crop 3.		—	—
Grass: Quantities weighed (*tons. cwts. qrs. lbs.*)					0 2 0 9		0 3 0 5		0 4 0 12		0 1 3 6		0 2 0 3		0 2 0 25		0 2 0 25		0 17 2 1	0 0 2 0
Oilcake (cotton-cake) (*ditto*)					0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 3 21	0 0 0 3
Yield of Milk, &c.					*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*
1	Cross short-horn	Aged	May 1	1,176	21 6	13 4	22 1	14 2	21 14	14 0	22 0	13 13	22 7	12 13	21 11	13 4	22 0	12 6	247 1	35 5
2	Cross short-horn	6	Feb. 15	1,253	14 0	8 6	14 6	8 3	13 6	9 5	13 8	8 13	14 4	7 7	13 0	8 2	13 6	8 6	154 8	22 1
3	Cross short-horn	3	April 13	878	15 12	9 7	16 0	10 3	16 6	9 6	16 0	9 6	16 6	9 9	16 1	8 14	16 4	8 8	178 2	25 7
4	Cross short-horn	8	May 20	1,118	24 6	16 5	25 8	15 7	26 6	16 5	25 0	15 13	24 14	17 10	26 0	13 7	27 0	15 4	289 5	41 5
5	Cross short-horn	7	April 17	1,194	18 0	11 1	18 6	11 0	18 2	11 0	18 0	10 6	18 1	10 8	18 9	9 14	18 2	9 12	200 13	28 11
			Totals	5,619	93 8	58 7	96 5	58 15	96 2	60 0	94 8	58 3	96 0	57 15	95 5	53 9	96 12	54 4	1,069 13	—
			Means	1,124	18 11	11 11	19 4	11 13	19 4	12 0	18 14	11 10	19 3	11 9	19 1	10 11	19 6	10 14	213 15	30 9
Ten Cows.—Sewaged Meadow Grass.																				
Food consumed. Grass: From which Field, Plot, and Crop					Ten-acre, Plot 4, Croo 3.		Ten-acre, Plot 4, Crop 3.		Ten-acre, Plot 4, Crop 3.		Ten-acre, Plot 4, Crop 3.		Ten-acre, Plot 4, Crop 3.		Ten-acre, Plot 4, Crop 3.		Ten-acre, Plot 4, Crop 3.		—	—
Grass: Quantities weighed (*tons. cwts. qrs. lbs.*)					0 15 0 3		0 15 0 19		0 16 0 16		0 16 0 18		0 16 1 24		0 15 2 17		0 15 2 23		5 10 1 8	0 1 2 8
Oilcake (cotton-cake) (*ditto*)					0 0 1 2		0 0 1 2		0 0 1 2		0 0 1 2		0 0 1 2		0 0 1 2		0 0 1 2		0 1 3 14	0 0 0 3
1	Cross short-horn	Aged	Mar. 10	1,182	16 4	11 12	16 0	12 7	17 2	12 3	16 1	12 4	15 12	10 6	17 2	11 0	16 10	11 0	195 15	28 0
2	Cross short-horn	8	June 15	1,384	21 2	13 1	20 8	13 4	20 8	13 7	20 4	13 6	20 0	12 7	18 4	13 14	21 0	13 4	234 5	33 7
3	Cross short-horn	6	Feb. 20	1,182	13 5	10 2	12 9	9 10	13 10	9 4	12 14	9 14	12 11	9 12	12 14	8 6	12 11	9 8	157 2	22 7
4	Cross short-horn	7	Feb. 15	1,070	14 12	9 14	15 10	9 4	14 2	9 2	14 0	10 1	14 14	9 6	12 0	9 7	13 6	8 14	164 12	23 8
5	Ayrshire	8	Feb. 22	1,019	11 8	8 11	12 11	8 7	12 3	9 0	12 6	8 1	13 1	8 3	13 2	8 0	13 0	9 0	147 5	21 1
6	Cross short-horn	6	April 14	1,048	19 0	11 5	18 14	11 5	17 12	11 1	19 0	11 9	18 0	12 0	18 10	10 8	19 1	10 7	208 8	29 13
7	Mongrel	Aged	April 12	684	16 1	9 1	15 11	8 11	14 14	10 4	15 4	8 14	15 4	8 15	14 14	8 7	15 4	7 0	168 3	24 1
8	Cross short-horn	6	April 16	1,140	11 12	9 8	10 0	9 8	12 4	9 4	12 10	9 2	12 8	9 14	13 4	9 0	13 2	8 9	150 5	21 8
9	Cross short-horn	7	April 13	1,040	20 3	11 10	18 1	13 12	18 0	12 8	17 4	12 10	16 14	13 5	14 6	14 0	15 14	13 3	211 10	30 4
10	Half short-horn	8	April 25	1,260	21 4	16 4	20 11	15 1	21 2	14 12	21 12	14 12	21 8	13 4	20 12	12 10	21 15	12 0	247 11	35 6
			Totals	11,209	165 3	111 4	160 11	111 5	161 9	110 13	161 7	110 9	160 8	107 8	155 4	105 4	161 15	102 13	1,886 1	—
			Means	1,121	16 8	11 2	16 1	11 2	16 3	11 1	16 2	11 1	16 1	10 12	15 8	10 9	16 3	10 5	188 10	26 15
Five Cows.—Unsewaged or Sewaged Italian Rye Grass.																				
Food consumed. Grass: From which Field, Plot, and Crop					Rye, Plot 0†, Crop 3.		Rye, Plot 0†, Crop 3.		Rye, Plot 0†, Crop 3.		Rye, Plot 0†, Crop 3.		Rye, Plot 0†, Crop 3.		Rye, Plot 0†, Crop 3.		Rye, Plot 0†, Crop 3.		—	—
Grass: Quantities weighed (*tons. cwts. qrs. lbs.*)					0 4 2 17½		0 4 2 15½		0 5 1 21		0 4 2 7½		0 4 0 14½		0 3 0 5½		0 3 0 8		1 9 2 5½	0 0 3 11
Oilcake (cotton-cake) (*ditto*)					0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 3 21	0 0 0 3
1	Cross short-horn	Aged	April 20	1,150	21 12	13 7	22 11	12 11	21 12	13 5	21 2	13 4	20 12	15 5	21 8	12 6	23 7	10 12	244 2	34 14
2	Ayrshire	6	Mar. 15	922	17 10	11 10	17 7	10 8	18 4	10 15	17 2	11 8	18 0	10 1	18 5	10 11	17 12	9 6	199 3	28 7
3	Cross short-horn	Aged	Mar. 1	1,146	15 13	9 4	15 12	9 4	15 12	9 4	15 10	9 7	16 4	9 8	15 3	9 6	16 10	8 5	175 6	25 1
4	Cross short-horn	Aged	April 15	1,271	19 14	11 12	19 9	12 12	19 9	12 11	20 6	10 9	18 7	11 11	21 5	11 4	20 10	11 13	222 4	31 12
5	Cross short-horn	6	Jan. 2	1,195	14 0	8 1	13 13	8 9	13 12	8 13	13 6	8 3	12 0	8 11	12 4	8 2	13 10	8 6	151 10	21 11
			Totals	5,684	89 1	54 2	89 4	53 12	89 1	55 0	87 10	52 15	85 7	55 4	88 9	51 13	92 1	48 10	992 9	—
			Means	1,137	17 13	10 13	17 14	10 12	17 13	11 0	17 3	10 9	17 1	11 1	17 11	10 6	18 7	9 12	198 8	28 6

* Not experimental.

† Unmeasured land, designated Plot 0 when unsewaged.

a Other grass was given when unsewaged meadow grass was not available.

Table X.—*continued.*

Detailed Record of Food consumed, and Milk yielded, by Cows fed on Unsewaged and Sewaged Meadow Grass, and on Italian Rye Grass, with Oilcake in addition. Third Season, 1868; 7 days.—August 25 to August 31.

Five Cows.—Unsewaged Meadow Grass. *a*

	Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (Aug. 17) lbs.	Tuesday. A.M.	Tuesday. P.M.	Wednesday. A.M.	Wednesday. P.M.	Thursday. A.M.	Thursday. P.M.	Friday. A.M.	Friday. P.M.	Saturday. A.M.	Saturday. P.M.	Sunday. A.M.	Sunday. P.M.	Monday. A.M.	Monday. P.M.	Total in 7 days.	Per head per day.
Food consumed.	Grass	From which Field, Plot, and Crop				Rye, * Crop 3.		Rye, * Crop 3.		Rye, * Crop 3.		Rye, * Crop 3.		Rye, * Crop 3.		Rye, * Crop 3.		Rye, * Crop 3.		—	—
		Quantities weighed (*tons. cwts. qrs. lbs.*)				0 1 2 24		0 3 3 3		0 2 2 23		0 2 0 5		0 2 2 11		0 1 1 20		0 1 1 20		0 15 2 22	0 0 1 22
	Oilcake (cotton-cake)	(*ditto*)				0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 3 21	0 0 0 3
						lbs. ozs.	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*
Yield of Milk, &c.	1	Cross short-horn	Aged	May 1	1,176	20 12	13 5	21 2	13 1	21 12	12 4	21 2	13 6	21 6	11 14	21 0	13 7	21 4	11 10	237 5	33 14
	2	Cross short-horn	6	Feb. 15	1,253	12 11	7 0	12 7	7 6	12 11	8 6	11 0	7 14	11 10	6 4	10 8	7 11	11 0	7 14	134 6	19 3
	3	Cross short-horn	3	April 13	878	16 0	10 0	16 11	10 3	16 3	9 0	15 1	8 15	14 14	8 10	15 4	9 2	15 6	9 1	174 6	24 15
	4	Cross short-horn	8	May 20	1,118	24 10	16 1	25 2	16 6	25 4	16 11	24 0	15 4	24 0	15 9	24 14	13 10	24 7	14 10	280 8	40 1
	5	Cross short-horn	7	April 17	1,194	17 12	10 0	17 11	10 12	18 5	10 8	16 2	9 2	16 13	8 12	17 0	9 0	16 11	9 15	188 7	26 15
				Totals	5,619	91 13	56 6	93 1	57 12	94 3	56 13	87 5	54 9	88 11	51 1	88 10	52 14	88 12	53 2	1,015 0	—
				Means	1,124	18 6	11 4	18 10	11 9	18 13	11 6	17 7	10 15	17 12	10 3	17 12	10 9	17 12	10 10	203 0	29 0

Ten Cows.—Sewaged Meadow Grass.

	Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (Aug. 17) lbs.	Tuesday. A.M.	Tuesday. P.M.	Wednesday. A.M.	Wednesday. P.M.	Thursday. A.M.	Thursday. P.M.	Friday. A.M.	Friday. P.M.	Saturday. A.M.	Saturday. P.M.	Sunday. A.M.	Sunday. P.M.	Monday. A.M.	Monday. P.M.	Total in 7 days.	Per head per day.
Food consumed.	Grass	From which Field, Plot, and Crop				Ten-acre, Plot 3, Crop 3.		Ten-acre, Plot 3, Crop 3.		Ten-acre, Plot 3, Crop 3.		Ten-acre, Plot 3, Crop 3.		Ten-acre, Plot 3, Crop 3.		Ten-acre, Plot 3, Crop 3.		Ten-acre, Plot 3, Crop 3.		—	—
		Quantities weighed (*tons. cwts. qrs. lbs.*)				0 14 2 5		0 12 1 11		0 15 1 21		1 0 0 1		0 15 1 27		0 17 0 25		0 17 0 26		5 12 1 4	0 1 2 12
	Oilcake (cotton-cake)	(*ditto*)				0 0 1 2		0 0 1 2		0 0 1 2		0 0 1 2		0 0 1 2		0 0 1 2		0 0 1 2		0 1 3 14	0 0 0 3
Yield of Milk, &c.,	1	Cross short-horn	Aged	Mar 10	1,182	15 0	10 1	15 2	10 14	15 12	11 6	15 10	10 8	15 6	11 13	16 0	10 8	15 7	10 5	183 12	26 4
	2	Cross short-horn	8	June 15	1,384	16 10	11 8	18 1	12 11	20 0	12 12	18 4	12 10	18 7	11 12	19 6	11 8	19 2	12 6	215 1	30 12
	3	Cross short-horn	6	Feb. 20	1,182	12 14	9 6	12 5	9 9	12 6	9 0	12 6	9 10	13 4	9 10	12 13	9 0	12 1	9 0	153 4	21 14
	4	Cross short-horn	7	Feb. 15	1,070	13 6	8 5	12 10	9 8	14 2	9 4	13 12	9 6	12 11	9 7	14 6	8 0	13 12	8 12	157 5	22 8
	5	Ayrshire -	8	Feb. 22	1,019	12 2	7 13	12 6	8 1	12 14	9 3	12 5	8 12	14 8	8 10	13 0	10 0	12 6	8 11	150 11	21 8
	6	Cross short-horn	6	April 14	1,048	16 10	9 12	16 4	11 4	18 12	11 0	18 6	10 8	18 12	10 9	18 12	10 6	18 3	10 0	199 2	28 7
	7	Mongrel -	Aged	April 12	884	12 7	7 12	14 3	7 9	13 9	7 15	13 3	8 0	12 9	8 2	11 3	7 8	12 6	8 0	144 6	20 10
	8	Cross short horn	6	April 16	1,140	12 0	8 10	11 0	9 6	11 6	9 8	11 0	8 14	10 11	7 12	14 2	7 14	12 4	7 11	142 2	20 5
	9	Cross short-horn	7	April 13	1,040	16 2	12 9	15 6	11 4	17 10	9 4	17 0	10 12	16 6	11 2	17 3	8 14	16 6	10 10	190 8	27 3
	10	Half short-horn	8	April 25	1,260	19 5	12 4	19 7	13 10	20 4	14 8	18 10	13 6	20 4	12 12	20 0	12 11	20 5	13 4	230 10	32 15
				Totals	11,209	146 8	98 0	146 12	103 12	156 11	103 12	150 8	102 6	152 14	101 9	156 13	96 5	152 4	98 11	1,766 13	—
				Means	1,121	14 10	9 13	14 11	10 6	15 11	10 6	15 1	10 4	15 5	10 2	15 11	9 10	15 3	9 14	176 11	25 4

Five Cows.—Unsewaged or Sewaged Italian Rye Grass.

	Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (Aug. 17) lbs.	Tuesday. A.M.	Tuesday. P.M.	Wednesday. A.M.	Wednesday. P.M.	Thursday. A.M.	Thursday. P.M.	Friday. A.M.	Friday. P.M.	Saturday. A.M.	Saturday. P.M.	Sunday. A.M.	Sunday. P.M.	Monday. A.M.	Monday. P.M.	Total in 7 days.	Per head per day.
Food consumed.	Grass	From which Field, Plot, and Crop				Rye, Plot 2, Crop 4.		Rye, Plot 2, Crop 4.		Rye, Plot 2, Crop 4.		Rye, Plot 2, Crop 4.		Rye, Plot 2, Crop 4.		Rye, * Crop 3.		Rye, * Crop 3.		—	—
		Quantities weighed (*tons. qrs. cwts. lbs.*)				0 2 2 20		0 5 2 15		0 4 2 23		0 6 3 15		0 1 3 15		0 3 0 24		0 3 0 24		1 8 0 24	0 0 3 6
	Oilcake (cotton-cake)	(*ditto*)				0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 3 21	0 0 0 3
Yield of Milk, &c.	1	Cross short-horn	Aged	April 20	1,150	20 7	12 4	22 3	12 3	23 4	12 9	23 2	12 9	22 0	13 8	20 15	11 4	21 0	11 15	239 3	34 3
	2	Ayrshire -	6	Mar. 15	922	18 6	10 1	17 8	10 10	17 4	11 7	18 0	11 8	17 5	11 6	17 6	9 1	16 7	10 12	197 1	28 2
	3	Cross short-horn	Aged	Mar. 1	1,146	15 0	8 11	15 3	10 0	16 3	9 9	16 5	9 12	15 6	9 12	15 8	9 2	14 7	9 3	174 1	24 14
	4	Cross short-horn	Aged	April 15	1,271	20 4	11 2	20 15	14 0	20 12	12 8	21 2	14 4	20 2	13 1	20 10	13 13	20 14	12 2	235 9	33 10
	5	Cross short-horn	6	Jan. 2	1,195	12 2	7 7	11 14	8 8	12 3	7 8	12 4	7 12	11 10	7 13	11 8	7 2	12 7	8 5	138 7	19 13
				Totals	5,684	86 3	49 9	87 11	55 5	89 10	53 9	90 13	55 13	86 7	55 8	85 15	50 6	85 3	52 5	984 5	—
				Means	1,137	17 4	9 15	17 9	11 1	17 15	10 11	18 2	11 3	17 5	11 2	17 3	10 1	17 0	10 7	196 14	28 2

Detailed Record of Food consumed, and Milk yielded, by Cows fed on Unsewaged and Sewaged Meadow Grass, and on Italian Rye Grass, with Oilcake in addition.
Third Season, 1863 ; 7 days.—September 1 to September 7.

Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (Aug. 17). lbs.	Tuesday. A.M.	Tuesday. P.M.	Wednesday. A.M.	Wednesday. P.M.	Thursday. A.M.	Thursday. P.M.	Friday. A.M.	Friday. P.M.	Saturday. A.M.	Saturday. P.M.	Sunday. A.M.	Sunday. P.M.	Monday. A.M.	Monday. P.M.	Total in 7 days.	Per head per day.
	FIVE COWS.—UNSEWAGED MEADOW GRASS. *a*																			
Food consumed. Grass	From which Field, Plot, and Crop			–	Rye, Crop 3*.		Rye, Crop 3*.		Rye, Crop 3*.		Rye, Crop 3*.		Rye, Crop 3*.		Rye, Crop 3*.		Rye, Crop 3*.		—	—
Food consumed. Grass	Quantities weighed (*tons. cwts. qrs. lbs.*)				0 4 3 0		0 2 0 13		0 2 2 22		0 2 3 12		0 2 2 19		0 3 3 5		0 3 3 6		1 2 2 21	0 0 2 17
Oilcake (cotton-cake)	–		(*ditto*)	–	0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 3 21	0 0 0 3
Yield of Milk, &c.					*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*
1	Cross short-horn	Aged	May 1	1,176	20 4	13 13	21 6	11 4	20 8	12 4	19 6	13 6	20 12	13 6	21 4	12 14	21 2	11 6	232 15	33 4
2	Cross short-horn	6	Feb. 15	1,253	12 2	6 11	12 0	5 11	10 0	7 8	10 0	6 6	12 12	7 5	11 0	6 12	12 2	7 2	127 7	18 3
3	Cross short-horn	3	April 13	878	14 2	9 1	14 14	8 6	14 0	8 15	15 12	9 10	15 4	9 3	15 0	8 8	14 9	8 2	165 6	23 10
4	Cross short-horn	8	May 20	1,118	22 13	14 10	23 2	10 10	22 3	12 12	21 4	16 7	21 12	14 4	22 4	14 10	22 0	14 4	252 15	36 2
7	Cross short-horn	7	April 17	1,194	16 12	10 5	16 4	9 2	16 1	9 6	17 0	11 1	16 15	12 8	16 12	10 1	17 15	8 6	188 8	26 15
			Totals	5,619	86 1	54 8	87 10	45 1	82 12	50 13	83 6	56 14	87 7	56 10	86 4	52 13	87 12	49 4	967 3	—
			Means	1,124	17 3	10 14	17 8	9 0	16 9	10 3	16 11	11 6	17 8	11 5	17 4	10 9	17 9	9 14	193 7	27 10
	TEN COWS.—SEWAGED MEADOW GRASS.																			
Food consumed. Grass	From which Field, Plot, and Crop			–	Five-acre, Plot 4, Crop 4.		Five-acre, Plot 4, Crop 4.		Ten-acre, Plot 4, Crop 4.		Five-acre, Plot 3, Crop 3.		Five-acre, Plot 3, Crop 3.		Ten-acre, Plot 3, Crop 3.		Ten-acre, Plot 3, Crop 3.		—	—
Food consumed. Grass	Quantities weighed (*tons. cwts. qrs. lbs.*)				0 17 0 10		0 18 1 14		0 12 1 20		0 13 3 9		1 6 0 17		0 12 1 2		0 12 1 8		5 12 1 24	0 1 2 12
Oilcake (cotton-cake)	–		(*ditto*)	–	0 0 1 2		0 0 1 2		0 0 1 2		0 0 1 2		0 0 1 2		0 0 1 2		0 0 1 2		0 1 3 14	0 0 0 3
1	Cross short-horn	Aged	Mar. 10	1,182	15 9	10 0	14 12	10 7	15 0	10 4	15 1	11 14	14 14	11 2	15 8	9 10	14 0	9 10	177 11	25 6
2	Cross short-horn	8	June 15	1,384	18 2	12 6	16 15	12 10	18 4	12 2	19 8	13 2	19 12	12 12	18 14	11 7	19 2	11 14	216 14	31 0
3	Cross short-horn	6	Feb. 20	1,182	12 7	8 8	12 6	8 6	12 3	9 12	12 12	10 3	13 2	9 9	12 7	8 0	12 10	8 7	150 12	21 9
4	Cross short-horn	7	Feb. 15	1,070	13 8	9 0	12 1	7 14	12 0	8 8	13 0	9 0	13 12	8 8	12 4	7 4	12 4	8 3	147 2	21 0
5	Ayrshire – –	8	Feb. 22	1,019	13 0	8 6	12 0	8 1	11 12	7 3	11 12	8 8	12 7	8 10	12 2	7 0	12 0	7 4	140 6	20 1
6	Cross short-horn	6	April 14	1,048	18 4	10 15	18 7	10 14	18 12	10 13	19 1	10 15	19 8	11 6	18 0	10 2	18 12	11 0	206 13	29 9
7	Mongrel – –	Aged	April 12	884	12 6	7 8	11 15	6 8	12 2	7 8	12 10	7 13	12 8	7 10	13 0	7 1	11 12	7 0	137 5	19 10
8	Cross short-horn	6	April 16	1,140	11 0	9 10	10 14	7 12	10 0	7 11	9 0	8 5	10 6	8 9	10 8	7 5	11 0	7 6	129 6	18 8
9	Cross short-horn	7	April 18	1,040	14 1	11 3	15 0	11 0	14 1	10 8	14 14	9 4	15 0	11 10	14 6	10 4	15 12	9 12	176 11	25 4
10	Half short-horn	8	April 25	1,260	21 6	13 0	20 1	13 0	20 14	14 6	20 14	13 11	20 7	13 10	20 2	12 0	21 14	11 10	236 15	33 14
			Totals	11,209	149 11	100 8	144 7	96 8	145 0	99 0	148 8	102 11	151 12	103 6	147 3	90 1	149 2	92 2	1,719 15	—
			Means	1,121	15 0	10 1	14 7	9 10	14 8	9 14	14 14	10 4	15 3	10 5	14 12	9 0	14 15	9 3	172 0	24 9
	FIVE COWS.—UNSEWAGED OR SEWAGED ITALIAN RYE GRASS.																			
Food consumed. Grass	From which Field, Plot, and Crop			–	Rye, Plot 3, Crop 5.		Rye, Plot 3, Crop 5.		Rye, Plot 3, Crop 5.		Rye, Plot 3, Crop 5.		Rye, Plot 3, Crop 5.		Rye, Plot 3, Crop 5.		Rye, Plot 3, Crop 5.		—	—
Food consumed. Grass	Quantities weighed (*tons. cwts. qrs. lbs.*)				0 8 1 10		0 4 0 11		0 4 2 23		0 5 0 15		0 5 3 5		0 4 2 11		0 4 2 17		1 17 1 8	0 1 0 7
Oilcake (cotton-cake)	–		(*ditto*)	–	0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 3 21	0 0 0 3
1	Cross short-horn	Aged	April 20	1,150	21 1	11 13	21 6	11 2	20 14	12 9	21 0	13 8	20 12	9 2	20 4	11 10	20 12	10 9	226 6	32 5
2	Ayrshire – –	6	Mar. 15	922	15 8	11 3	17 8	7 14	14 6	10 4	18 10	12 2	16 8	9 10	17 8	9 10	15 0	9 2	184 13	26 6
3	Cross short-horn	Aged	Mar. 1	1,146	18 6	8 9	15 12	9 9	16 15	9 4	14 6	9 14	14 10	8 12	15 10	9 15	17 10	3 6	177 10	25 6
4	Cross short-horn	Aged	April 15	1,271	20 11	11 14	20 7	12 1	19 0	12 14	19 10	13 14	20 1	11 5	20 6	12 1	21 5	10 4	225 13	32 4
5	Cross short-horn	6	Jan. 2	1,195	12 5	7 10	13 4	7 7	13 2	8 11	13 11	8 3	12 14	7 11	13 4	8 9	14 0	8 6	149 1	21 5
			Totals	5,684	87 15	51 1	88 5	48 1	84 5	53 10	87 5	57 9	84 13	46 8	87 0	51 13	83 11	46 11	963 11	—
			Means	1,137	17 9	10 3	17 11	9 10	16 14	10 12	17 7	11 8	16 15	9 5	17 7	10 6	17 12	9 5	192 12	27 9

a Other grass was given when unsewaged meadow grass was not available.

* Not experimental.

Table X.—*continued.*

Detailed Record of Food consumed, and Milk yielded, by Cows fed on Unsewaged and Sewaged Meadow Grass, and on Italian Rye Grass, with Oilcake in addition. Third Season, 1863; 7 days.—September 8 to September 14.

Five Cows.—Unsewaged Meadow Grass. *a*

					Tuesday.		Wednesday.		Thursday.		Friday.		Saturday.		Sunday.		Monday.		Total in 7 days.	Per head per day.
Food consumed. Grass — From which Field, Plot, and Crop					Rye, * Crop 3.		Five-acre, Plot 0†, Crop 2.		Five-acre, Plot 0†, Crop 2.		Ten-acre, Plot 0†, Crop 2.		Ten-acre, Plot 0†, Crop 2.		Five-acre, Plot 0†, Crop 2.		Five-acre, Plot 0†, Crop 2.		—	—
Quantities weighed (*tons. cwts. qrs. lbs.*)					0 3 2 23		0 3 3 22½		0 5 1 16½		0 5 1 14		0 5 3 18½		0 4 3 22		0 4 3 27		1 14 1 3½	0 0 3 26
Oilcake (cotton-cake) (*ditto.*)					0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 3 21	0 0 0 3
Yield of Milk, &c. Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (Sept. 14) *lbs.*	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	—	—
					lbs. ozs.	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*
1	Cross short-horn	Aged	May 1	1,186‡	21 4	13 3	20 8	12 8	21 0	13 2	20 15	11 8	21 4	12 10	20 11	11 5	21 10	12 4	233 12	33 6
2	Cross short-horn	6	Feb. 15	1,274‡	10 14	8 1	11 10	7 10	11 8	7 11	12 0	7 0	11 12	7 6	11 6	7 12	13 0	7 15	135 9	19 6
3	Cross short-horn	3	April 13	899‡	14 7	9 7	15 0	8 14	15 9	9 7	15 1	8 9	14 8	8 0	14 0	8 2	15 0	8 11	164 11	23 8
4	Cross short-horn	8	May 20	1,146‡	20 1	15 8	22 10	14 11	22 10	15 10	22 7	14 14	23 4	14 14	22 4	14 10	23 2	15 0	261 9	37 6
5	Cross short-horn	7	April 17	1,267‡	17 0	10 2	17 8	9 14	17 7	9 12	17 0	9 10	17 3	9 7	16 12	9 13	17 8	10 0	189 0	27 0
			Totals	5,772	83 10	50 5	87 4	53 9	88 2	55 10	87 7	51 9	87 15	52 5	85 1	51 10	90 4	53 14	984 9	—
			Means	1,154	16 12	11 4	17 7	10 12	17 10	11 2	17 8	10 5	17 9	10 7	17 0	10 5	18 1	10 13	196 15	28 2

Ten Cows.—Sewaged Meadow Grass.

					Tuesday.		Wednesday.		Thursday.		Friday.		Saturday.		Sunday.		Monday.		Total in 7 days.	Per head per day.
Food consumed. Grass — From which Field, Plot, and Crop					Five-acre, Plot 3, Crop 3.		Five-acre, Plot 4, Crop 4.		Five-acre, Plot 4, Crop 4.		Ten-acre, Plot 2. Crop 3.		Ten-acre, Plot 2, Crop 3.		Five-acre, Plot 2, Crop 3.		Five-acre, Plot 2, Crop 3.		—	—
Quantities weighed (*tons. cwts. qrs. lbs.*)					0 14 3 14		1 7 3 24		1 1 2 21		0 17 1 26		1 0 0 23		0 10 0 11		0 10 0 17		6 2 1 24	0 1 3 0
Oilcake (cotton-cake) (*ditto.*)					0 0 1 2		0 0 1 2		0 0 1 2		0 0 1 2		0 0 1 2		0 0 1 2		0 0 1 2		0 1 3 14	0 0 0 8
Yield of Milk, &c. 1	Cross short-horn	Aged	Mar. 10	1,208	14 8	10 10	14 10	10 13	16 0	10 8	15 10	9 3	14 8	10 0	14 7	10 10	16 9	10 2	178 2	25 7
2	Cross short-horn	8	June 15	1,394	18 4	11 10	18 0	13 1	18 10	11 9	18 6	11 6	18 3	12 1	17 1	10 14	20 10	10 14	210 9	30 1
3	Cross short-horn	6	Feb. 20	1,174	12 4	8 14	12 1	9 5	12 13	9 0	13 0	7 8	11 10	8 6	11 12	7 14	12 12	7 0	144 3	20 10
4	Cross short-horn	7	Feb. 15	1,090	12 2	8 0	12 0	8 4	13 0	7 10	12 14	7 0	11 1	8 2	11 14	8 6	13 3	8 1	141 9	20 4
5	Ayrshire	8	Feb. 22	1,035	11 11	7 8	11 10	8 5	12 0	8 3	12 0	7 6	11 12	8 1	11 4	7 8	12 13	7 0	137 1	19 9
6	Cross short-horn	6	April 14	1,096	18 5	11 4	17 11	11 12	18 12	11 0	17 4	9 8	17 7	11 2	17 6	10 4	17 10	10 13	200 2	28 9
7	Mongrel	Aged	April 12	892	11 0	7 14	12 0	7 2	12 10	7 1	12 0	7 6	12 10	7 5	12 0	7 0	12 6	5 14	134 4	19 3
8	Cross short-horn	6	April 16	1,190	11 3	8 4	11 10	7 11	10 6	8 10	11 6	7 10	17 0	8 7	12 4	8 12	12 2	8 14	144 3	20 10
9	Cross short-horn	7	April 18	1,087	15 1	10 0	14 12	12 7	15 11	9 6	16 7	9 2	16 5	9 5	15 11	10 2	16 3	10 10	181 2	25 14
10	Half short-horn	8	April 25	1,278	20 4	13 0	20 6	13 10	20 12	14 8	20 2	12 6	20 0	13 2	20 8	12 4	20 2	11 10	232 10	33 4
			Totals	11,444	144 10	97 0	144 12	102 6	150 10	97 7	149 1	88 7	150 8	95 15	144 3	93 10	154 6	90 14	1,703 13	—
			Means	1,144	14 7	9 11	14 8	10 4	15 1	9 12	14 14	8 14	15 1	9 9	14 7	9 6	15 7	9 1	170 6	24 5

Five Cows.—Unsewaged or Sewaged Italian Rye Grass.

					Tuesday.		Wednesday.		Thursday.		Friday.		Saturday.		Sunday.		Monday.		Total in 7 days.	Per head per day.
Food consumed. Grass — From which Field, Plot, and Crop					Rye, Plots2&3, Crop5.		Rye, * Crop 3.		Rye, Plot 1, Crop 4.		Rye, Plot 1, Crop 4.		Rye, Plot 1, Crop 4.		Rye, * Crop 3.		Rye, * Crop 3.		—	—
Quantities weighed (*tons. cwts. qrs. lbs.*)					0 4 2 14		0 4 2 24§		0 2 1 17½		0 4 0 10		0 3 0 5		0 1 1 2		0 1 1 2		1 1 1 18½	0 0 2 18
Oilcake (cotton-cake) (*ditto.*)					0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 0 15		0 0 3 21	0 0 0 3
Yield of Milk, &c. 1	Cross short-horn	Aged	April 20	1,130‡	17 9	13 7	21 0	12 3	20 8	13 13	18 14	13 0	21 10	12 6	20 0	12 0	18 10	9 11	224 11	32 2
2	Ayrshire	6	Mar. 15	932‡	16 3	10 10	17 5	10 9	17 10	11 14	17 5	10 13	17 15	10 0	10 2	10 1	15 10	8 9	190 10	27 4
3	Cross short-horn	Aged	Mar. 1	1,169‡	15 0	9 11	16 0	10 11	14 12	11 0	14 12	9 4	14 14	9 6	14 2	8 8	14 12	7 12	170 8	24 6
4	Cross short-horn	Aged	April 15	1,299‡	18 1	13 9	21 8	12 8	20 10	13 5	19 5	11 12	20 12	12 0	19 0	12 10	19 2	10 4	224 6	32 1
5	Cross short-horn	6	Jan. 2	1,221‡	12 13	9 2	13 0	9 3	12 12	9 10	12 9	7 1	12 0	8 3	11 14	8 2	12 4	7 14	146 7	20 15
			Totals	5,754	79 10	56 7	88 13	55 2	86 4	59 10	82 13	51 14	87 3	51 15	81 2	51 5	80 6	44 2	956 10	—
			Means	1,151	15 15	11 5	17 12	11 0	17 4	11 15	16 9	10 6	17 7	10 6	16 4	10 4	16 1	8 13	191 5	27 5

* Not experimental. † Unmeasured land, designated Plot 0 when unsewaged.
‡ In these cases the weights recorded are of an intermediate weighing taken on September 8. § 1 cwt. 2 qrs. 21 lbs. of this quantity came off Rye, Plot 2, Crop 5.

Detailed Record of Food consumed, and Milk yielded, by Cows fed on Unsewaged and Sewaged Meadow Grass, and on Italian Rye Grass, with Oilcake in addition. Third Season, 1863; 7 days.—September 15 to September 21.

Five Cows.—Unsewaged Meadow Grass.

					Tuesday.		Wednesday.		Thursday.		Friday.		Saturday.		Sunday.		Monday.		Total in 7 days.	Per head per day.
Food consumed. Grass	From which Field, Plot, and Crop				Five-acre, Plot 0*, Crop 2.		Five-acre, Plot 0*, Crop 2.		Ten-acre, Plot 0*, Crop 2.		Ten-acre, Plot 0*, Crop 2.		Ten-acre, Plot 0*, Crop 2.		Ten-acre, Plot 1, Crop 2.		Ten-acre, Plot 1, Crop 2.		—	—
Grass	Quantities weighed (*tons. cwts. qrs. lbs.*)				0 3 3 1½		0 5 3 8½		0 4 3 1		0 3 2 8		0 4 0 7		0 4 2 3½		0 4 2 6		1 11 0 7½	0 0 3 15
Oilcake	(3 parts cotton & 2 parts rape-cake) (*ditto*)				0 0 0 25		0 0 0 25		0 0 0 25		0 0 0 25		0 0 0 25		0 0 0 25		0 0 0 25		0 1 2 7	0 0 0 5
Yield of Milk, &c. Cows Nos.	Breed.	Years old.	Dates of Calving.	Weights (Sept. 14) *lbs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*
1	Cross short-horn	Aged	May 1	1,199	21 6	13 6	22 0	11 12	21 10	12 7	20 7	13 2	20 4	13 1	21 12	11 12	21 4	12 2	236 5	33 12
2	Cross short-horn	6	Feb. 15	1,268	12 10	8 10	12 1	7 5	11 13	7 10	12 8	7 6	12 14	7 1	11 14	6 11	12 0	6 11	137 2	19 9
3	Cross short-horn	3	April 13	897	15 1	8 14	15 3	8 6	14 0	8 13	14 2	9 0	14 5	8 5	13 1	8 0	14 13	7 9	159 8	22 13
4	Cross short-horn	8	May 20	1,141	21 8	16 1	24 13	12 12	22 14	14 10	22 0	15 10	23 5	14 9	22 4	14 10	21 6	13 5	259 11	37 2
5	Cross short-horn	7	April 17	1,236	17 7	10 2	18 3	8 7	15 2	10 4	17 6	11 0	18 5	10 2	18 13	9 0	18 4	10 0	192 7	27 8
			Totals	5,741	88 0	57 1	92 4	48 10	85 7	53 12	86 7	56 2	89 1	53 2	87 12	50 1	87 11	49 11	935 1	—
			Means	1,143	17 10	11 6	18 7	9 12	17 1	10 12	17 4	11 4	17 13	10 10	17 9	10 0	17 9	9 15	197 0	28 2

Ten Cows.—Sewaged Meadow Grass.

					Tuesday.		Wednesday.		Thursday.		Friday.		Saturday.		Sunday.		Monday.		Total in 7 days.	Per head per day.
Food consumed. Grass	From which Field, Plot, and Crop				Five-acre, Plot 2, Crop 3.		Five-acre, Plot 4, Crop 4.		Five-acre, Plot 2, Crop 3.		Ten-acre, Plot 00*, Crop 3.		Ten-acre, Plot 2, Crop 3.		Ten-acre, Plot 2, Crop 3.		Ten-acre, Plot 2, Crop 3.		—	—
Grass	Quantities weighed (*tons. cwts. qrs. lbs.*)				0 13 2 19		0 14 0 21		0 12 0 17		0 12 0 18		0 17 1 15		0 11 3 10		0 11 3 16		4 13 1 4	0 1 1 9
Oilcake	(3 parts cotton & 2 parts rape-cake) (*ditto*)				0 0 1 22		0 0 1 22		0 0 1 22		0 0 1 22		0 0 1 22		0 0 1 22		0 0 1 22		0 3 0 14	0 0 0 5
Yield of Milk, &c. Cows Nos.	Breed.	Years old.	Dates of Calving.	Weights (Sept. 14) *lbs.*	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.		
1	Cross short-horn	Aged	Mar. 10	1,208	14 6	10 10	16 8	11 2	16 4	11 0	15 6	11 4	15 10	11 4	15 6	10 0	15 0	9 11	183 7	26 3
2	Cross short-horn	8	June 15	1,394	17 0	12 11	19 0	12 2	18 0	12 8	18 3	12 6	18 1	12 6	18 2	10 12	18 10	11 6	211 3	30 3
3	Cross short-horn	6	Feb. 20	1,174	11 14	9 2	12 10	8 10	12 1	8 10	12 4	9 5	12 2	8 12	11 6	7 8	11 14	7 13	143 15	20 9
4	Cross short-horn	7	Feb. 15	1,090	12 7	9 4	14 0	8 8	12 7	8 12	14 3	9 14	14 0	9 8	14 5	8 10	14 0	8 3	158 1	22 9
5	Ayrshire – –	8	Feb. 22	1,035	11 0	8 4	12 11	7 10	12 2	10 2	11 12	8 0	12 0	7 10	11 10	7 0	11 7	7 13	130 1	19 11
6	Cross short-horn	6	April 14	1,096	16 10	11 13	19 3	11 6	18 3	7 15	18 8	11 14	17 12	11 8	18 6	11 8	18 0	9 10	202 4	28 14
7	Mongrel – –	Aged	April 12	892	11 0	8 2	13 0	8 1	12 2	7 8	12 10	7 8	12 0	7 7	11 6	6 14	14 0	7 1	138 11	19 13
8	Cross short-horn	6	April 16	1,190	11 14	8 15	11 6	7 0	11 4	8 10	11 0	8 8	10 14	8 13	10 11	7 7	10 11	8 8	135 9	19 6
9	Cross short-horn	7	April 13	1,087	15 1	10 6	17 10	9 10	16 13	11 2	15 8	13 1	17 5	10 2	15 4	9 1	16 0	12 11	189 10	27 1
10	Half short-horn	8	April 25	1,278	19 8	13 1	21 4	13 8	19 11	13 12	20 14	13 13	20 8	13 14	19 12	12 2	21 10	12 7	235 12	33 11
			Totals	11,444	140 12	102 4	157 4	97 9	148 15	99 15	150 4	105 9	150 4	101 4	146 4	90 14	151 4	95 3	1,737 9	—
			Means	1,144	14 1	10 4	15 12	9 12	14 14	10 0	15 0	10 9	15 1	10 2	14 10	9 1	15 2	9 8	173 12	24 13

Five Cows.—Unsewaged or Sewaged Italian Rye Grass.

					Tuesday.		Wednesday.		Thursday.		Friday.		Saturday.		Sunday.		Monday.		Total in 7 days.	Per head per day.
Food consumed. Grass	From which Field, Plot, and Crop				Rye, Plot 0*, Crop 4.		Rye, Plot 0*, Crop 4.		Rye, Plot 0*, Crop 4.		Rye, Plot 0*, Crop 4.		Rye, Plot 0*, Crop 4.		Rye, Plot 0*, Crop 4.		Rye, Plot 0*, Crop 4.		—	—
Grass	Quantities weighed (*tons. cwts. qrs. lbs.*)				0 5 0 21		0 6 0 13		0 4 0 17		0 7 1 3½		0 5 3 7½		0 5 2 25½		0 5 3 0		2 0 0 3½	1 0 16
Oilcake	(3 parts cotton & 2 parts rape-cake) (*ditto*)				0 0 0 25		0 0 0 25		0 0 0 25		0 0 0 25		0 0 0 25		0 0 0 25		0 0 0 25		0 1 2 7	0 0 5
Yield of Milk, &c. Cows Nos.	Breed.	Years old.	Dates of Calving.	Weights (Sept. 14) *lbs.*	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.		
1	Cross short-horn	Aged	April 20	1,121	17 12	12 10	23 3	11 8	22 10	11 12	21 4	14 1	20 0	13 4	19 7	10 8	19 10	11 8	229 1	32 12
2	Ayrshire – –	6	Mar. 15	934	15 5	10 9	17 6	9 4	16 1	9 14	15 6	11 2	15 0	11 6	17 2	10 12	17 8	9 14	186 9	26 10
3	Cross short-horn	Aged	Mar. 1	1,166	14 7	9 1	14 12	8 15	14 1	9 6	17 5	10 2	17 9	10 12	14 11	10 0	14 2	8 2	173 5	24 12
4	Cross short-horn	Aged	April 15	1,295	18 5	12 4	19 8	11 10	18 12	12 0	19 0	12 14	19 0	13 8	20 9	11 4	20 0	11 14	220 8	31 8
5	Cross short-horn	6	Jan. 2	1,234	11 10	8 2	12 2	8 8	11 10	8 6	13 6	8 11	12 7	8 14	14 0	7 6	12 10	7 12	145 8	20 13
			Totals	5,750	77 7	52 10	86 15	49 13	83 2	51 6	86 5	56 14	84 0	57 12	85 13	49 14	83 14	49 2	954 15	—
			Means	1,150	15 8	10 8	1 6	10 0	16 10	10 4	17 4	11 6	16 13	11 9	17 3	10 0	16 12	9 13	191 0	27 5

* Unmeasured land; designated Plot 0 when unsewaged, and Plot 00 when sewaged.

Table X.—*continued.*

Detailed Record of Food consumed, and Milk yielded, by Cows fed on Unsewaged and Sewaged Meadow Grass, and on Italian Rye Grass, with Oilcake in addition.
Third Season, 1863; 7 days.—September 22 to September 28.

Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (Sept. 14) lbs.	Tuesday. A.M.	Tuesday. P.M.	Wednesday. A.M.	Wednesday. P.M.	Thursday. A.M.	Thursday. P.M.	Friday. A.M.	Friday. P.M.	Saturday. A.M.	Saturday. P.M.	Sunday. A.M.	Sunday. P.M.	Monday. A.M.	Monday. P.M.	Total in 7 days.	Per head per day.
Five Cows.—Unsewaged Meadow Grass.																				
Food consumed. Grass	From which Field, Plot, and Crop				Five-acre, Plot 0*, Crop 2.		Five-acre, Plot 1, Crop 2.		Five-acre, Plot 1, Crop 2.		Five-acre, Plot 1, Crop 2.		—		Ten-acre, Plot 1, Crop 2.		Ten-acre, Plot 1, Crop 2.		—	—
	Quantities weighed (*tons. cwts. qrs. lbs.*)				0 3 1 12		0 4 1 14½		0 2 3 10½		0 8 1 2		—		0 8 0 16		0 8 0 21		1 15 0 20	0 1 0 1
Oilcake (3 parts cotton & 2 parts rape-cake) (*ditto*)					0 0 0 25		0 0 0 25		0 0 0 25		0 0 0 25		0 0 0 25		0 0 0 25		0 0 0 25		0 1 2 7	0 0 0 5
Yield of Milk, &c.					*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*
1	Cross short-horn	Aged	May 1	1,204†	20 8	12 12	21 8	13 13	20 12	11 15	21 6	13 7	20 8	12 12	20 4	11 0	20 6	12 14	232 13	33 6
2	Cross short-horn	6	Feb. 15	1,272†	11 0	6 11	10 6	7 3	11 0	5 7	11 0	6 10	10 12	8 0	10 0	8 1	11 8	6 8	124 2	17 12
3	Cross short-horn	3	April 13	889†	13 14	8 11	14 11	8 15	14 0	8 11	14 6	9 10	14 7	9 6	14 7	8 8	14 4	9 10	163 8	23 6
4	Cross short-horn	8	May 20	1,098†	21 12	14 14	22 8	13 11	22 3	14 4	22 10	13 10	21 11	14 11	21 8	9 12	23 1	14 10	250 13	35 13
5	Cross short-horn	7	April 17	1,244†	17 3	10 2	18 1	9 14	17 2	9 2	17 13	10 6	17 3	9 10	17 2	12 4	17 2	9 11	192 11	27 8
			Totals	5,707	84 5	53 2	87 2	53 8	85 1	49 7	87 3	53 11	84 9	54 7	83 5	49 9	86 5	53 5	964 15	—
			Means	1,141	16 14	10 10	17 7	10 11	17 0	9 14	17 7	10 12	16 15	10 14	16 10	9 15	17 4	10 11	193 0	27 9
Ten Cows.—Sewaged Meadow Grass.																				
Food consumed. Grass	From which Field, Plot, and Crop				Five-acre, Plot 4, Crop 4.		Five-acre, Plot 4, Crop 4.		Five-acre, Plot 4, Crop 4.		Five-acre, Plot 4, Crop 4.		Ten-acre, Plot 2, Crop 3.		Ten-acre, Plot 2, Crop 3.		Ten-acre, Plot 2, Crop 3.		—	—
	Quantities weighed (*tons. cwts. qrs. lbs.*)				0 14 1 0		0 16 3 21		1 1 0 24		0 17 2 24		0 17 1 6		0 10 1 16		0 10 1 12		5 8 0 19	0 1 2 5
Oilcake (3 parts cotton & 2 parts rape-cake) (*ditto*)					0 0 1 22		0 0 1 22		0 0 1 22		0 0 1 22		0 0 1 22		0 0 1 22		0 0 1 22		0 3 0 14	0 0 0 5
1	Cross short-horn	Aged	Mar. 10	1,208	15 0	10 3	14 15	10 12	15 0	10 3	14 12	10 12	14 8	10 13	14 2	9 10	15 1	10 7	176 2	25 3
2	Cross short-horn	8	June 15	1,394	16 10	11 8	17 12	11 11	17 10	11 6	18 6	11 10	18 7	11 11	17 5	11 6	18 5	11 8	205 3	29 5
3	Cross short-horn	6	Feb. 20	1,174	12 1	8 8	12 0	8 6	12 1	8 13	11 12	8 15	11 8	8 10	10 11	7 14	11 12	9 5	142 4	20 5
4	Cross short-horn	7	Feb. 15	1,090	11 14	9 7	14 0	9 2	13 14	9 2	13 13	9 7	13 10	8 11	12 0	8 6	12 8	8 0	153 14	22 0
5	Ayrshire - -	8	Feb. 22	1,035	11 0	7 0	10 11	7 12	10 13	7 5	11 6	8 4	11 8	7 10	10 12	6 10	11 4	7 3	129 2	18 7
6	Cross short-horn	6	April 14	1,096	17 14	10 12	18 4	12 3	18 12	12 2	20 0	11 0	20 10	11 8	19 0	12 0	20 0	11 15	216 0	30 14
7	Mongrel - -	Aged	April 12	892	11 12	6 15	11 6	6 6	11 0	6 7	11 2	6 4	10 9	6 8	10 0	6 6	11 10	7 0	123 5	17 10
8	Cross short-horn	6	April 16	1,190	10 10	8 1	10 4	8 7	9 4	8 3	9 5	7 14	9 0	8 5	10 6	8 2	11 2	8 7	127 6	18 3
9	Cross short-horn	7	April 13	1,087	15 8	10 3	17 1	10 7	16 2	10 5	15 11	11 10	14 11	11 13	15 7	9 14	14 6	11 8	184 10	26 6
10	Half short-horn	8	April 25	1,278	21 11	11 15	20 5	14 6	20 2	13 2	21 2	13 9	20 10	13 13	19 11	11 15	21 4	10 13	234 6	33 8
			Totals	11,444	144 0	94 8	146 10	99 8	144 10	97 0	147 5	99 5	145 1	99 6	139 6	92 3	147 4	96 2	1,692 4	—
			Means	1,144	14 6	9 7	14 11	9 15	14 7	9 11	14 12	9 15	14 8	9 15	13 15	9 4	14 12	9 10	169 4	24 3
Five Cows.—Unsewaged or Sewaged Italian Rye Grass.																				
Food consumed. Grass	From which Field, Plot, and Crop				Rye, Plot 0*, Crop 4.		Rye, Plot 2, Crop 5.		Rye, Plot 2, Crop 5.		Rye, ‡ Crop 4, &c.		Rye, ‡ Crop 4.		Rye, ‡ Crop 4.		Ryo, ‡ Crop 4.		—	—
	Quantities weighed (*tons. cwts. qrs. lbs.*)				0 4 2 19½		0 4 2 9		0 4 2 5		0 4 0 6		0 3 2 10		0 3 2 21		0 3 2 21		1 8 3 7½	0 0 3 8
Oilcake (3 parts cotton & 2 parts rape-cake) (*ditto*)					0 0 0 25		0 0 0 25		0 0 0 25		0 0 0 25		0 0 0 25		0 0 0 25		0 0 0 25		0 1 2 7	0 0 0 5
1	Cross short-horn	Aged	April 20	1,121	20 3	12 0	20 0	12 4	19 14	13 1	19 10	12 6	20 6	12 12	18 7	13 9	18 6	11 4	224 2	32 0
2	Ayrshire - -	6	Mar. 15	934	17 7	11 0	17 15	10 12	17 10	11 8	17 15	11 9	18 0	10 11	18 2	11 0	18 4	10 5	202 2	28 14
3	Cross short-horn	Aged	Mar. 1	1,166	15 0	8 12	15 0	9 11	14 1	8 15	14 12	9 4	15 2	10 8	15 2	10 0	15 8	8 3	169 14	24 4
4	Cross short-horn	Aged	April 15	1,295	19 2	12 4	18 10	12 9	17 4	12 4	18 2	11 12	17 10	9 13	17 11	11 4	16 6	9 4	203 15	29 2
5	Cross short-horn	6	Jan. 2	1,234	12 8	8 12	13 4	9 0	12 12	8 10	12 4	9 0	12 11	8 10	13 3	8 2	10 12	7 10	147 2	21 0
			Totals	5,750	84 4	52 12	84 13	54 4	81 9	54 6	82 11	53 15	83 13	52 6	82 9	53 15	79 4	46 10	947 3	—
			Means	1,150	16 14	10 9	16 15	10 13	16 5	10 14	16 9	10 13	16 12	10 7	16 8	10 13	15 14	9 5	189 7	27 1

Detailed Record of Food consumed, and Milk yielded, by Cows fed on Unsewaged and Sewaged Meadow Grass, and on Italian Rye Grass, with Oilcake in addition.
Third Season, 1863; 7 days.—September 29 to October 5.

Five Cows.—Unsewaged Meadow Grass. a

					Tuesday.		Wednesday.		Thursday.		Friday.		Saturday.		Sunday.		Monday.		Total in 7 days.	Per head per day.
Food consumed. Grass { From which Field, Plot, and Crop					Five-acre, Plot 3, Crop 4.		Five-acre, Plot 3, Crop 4.		Five-acre, Plot 3, Crop 4.		Ten-acre,[a] Plot 4, Crop 4.		Ten-acre, Plot 4, Crop 4.		Ten-acre, Plot 4, Crop 4.		Ten-acre, Plot 4, Crop 4.		—	—
Quantities weighed (tons. cwts. qrs. lbs.)					0 6 2 23		0 9 2 3		0 5 2 22		0 9 3 16		0 6 2 2		0 5 0 5		0 5 0 7		2 8 1 22	0 1 1 15
Oilcake (3 parts cotton & 2 parts rape-cake) (ditto)					0 0 0 25		0 0 0 25		0 0 0 25		0 0 0 25		0 0 0 25		0 0 0 25		0 0 0 25		0 1 2 7	0 0 0 5
Yield of Milk, &c. Cows Nos.	Breed.	Years old.	Dates of Calving.	Weights (Sept. 14) lbs.	A.M. lbs. ozs.	P.M. lbs. ozs.	A.M. lbs. ozs.	P.M. lbs. ozs.	A.M. lbs. ozs.	P.M. lbs. ozs.	A.M. lbs. ozs.	P.M. lbs. ozs.	A.M. lbs. ozs.	P.M. lbs. ozs.	A.M. lbs. ozs.	P.M. lbs. ozs.	A.M. lbs. ozs.	P.M. lbs. ozs.	lbs. ozs.	lbs. ozs.
1	Cross short-horn	Aged	May 1	1,204*	21 0	12 12	19 14	11 6	19 9	12 3	20 12	11 8	20 14	11 14	22 9	11 8	22 1	9 15	227 13	32 9
2	Cross short-horn	6	Feb. 15	1,272*	10 12	6 4	11 0	6 12	10 11	7 7	10 10	6 5	11 0	6 6	10 8	7 1	10 11	6 1	121 8	17 6
3	Cross short horn	3	April 13	889*	16 2	8 13	14 1	8 0	15 7	9 6	15 10	8 12	15 2	9 2	16 15	8 4	15 0	8 1	168 11	24 2
4	Cross short-horn	8	May 20	1,098*	21 14	16 14	23 10	14 12	22 14	16 0	24 8	18 8	23 0	16 8	24 0	14 2	23 15	12 0	267 9	38 3
5	Cross short-horn	7	April 17	1,244*	17 2	9 4	17 3	9 1	18 0	10 10	17 0	10 10	16 15	10 4	18 10	9 12	17 0	8 2	189 9	27 1
			Totals	5,707	86 14	53 15	85 12	49 15	86 9	55 10	88 8	50 11	86 15	54 2	92 10	50 11	88 11	44 3	975 2	—
			Means	1,141	17 6	10 13	17 2	10 0	17 5	11 2	17 11	10 2	17 6	10 13	18 9	10 2	17 12	8 13	195 0	27 14

Ten Cows.—Sewaged Meadow Grass.

					Tuesday.		Wednesday.		Thursday.		Friday.		Saturday.		Sunday.		Monday.		Total in 7 days.	Per head per day.
Food consumed. Grass { From which Field, Plot, and Crop					Five-acre, Plot 3, Crop 4.		Five-acre, Plot 3, Crop 4.		Five-acre, Plot 3, Crop 4.		Ten-acre, Plot 4, Crop 4.		Ten-acre, Plot 4, Crop 4.		Ten-acre, Plot 4, Crop 4.		Ten-acre, Plot 4, Crop 4.		—	—
Quantities weighed (tons. cwts. qrs. lbs.)					0 18 1 18		0 19 0 5		0 11 1 17		0 19 3 5		0 13 0 2		0 10 0 11		0 10 0 14		4 16 3 16	0 1 1 15
Oilcake (3 parts cotton & 2 parts rape-cake) (ditto)					0 0 1 22		0 0 1 22		0 0 1 23		0 0 1 22		0 0 1 22		0 0 1 22		0 0 1 22		0 3 0 14	0 0 0 5
1	Cross short-horn	Aged	Mar. 10	1,208	14 11	10 2	15 2	8 13	14 3	10 0	15 3	10 4	15 7	10 13	14 6	9 1	14 1	8 14	171 0	24 7
2	Cross short-horn	8	June 15	1,394	17 12	11 8	17 6	9 12	16 10	11 6	17 10	11 0	17 6	11 3	17 4	10 14	17 8	10 0	197 3	28 2
3	Cross short-horn	6	Feb. 20	1,174	11 0	8 0	11 10	8 4	11 12	8 0	11 11	8 5	11 14	8 0	11 4	7 7	11 4	7 6	135 13	19 6
4	Cross short-horn	7	Feb. 15	1,090	13 4	8 8	13 0	7 11	13 0	8 6	12 3	7 14	12 0	12 6	12 13	7 10	14 0	7 12	150 7	21 8
5	Ayrshire	8	Feb. 22	1,035	10 0	7 14	10 4	7 1	11 0	7 3	10 0	6 15	11 1	7 13	10 10	7 4	11 6	6 11	125 2	17 14
6	Cross short-horn	6	April 14	1,096	19 1	11 9	19 12	11 4	18 6	11 11	19 10	12 3	19 6	11 0	19 10	11 0	20 4	10 6	215 2	30 12
7	Mongrel	Aged	April 12	892	11 12	9 5	11 10	6 7	11 0	7 2	11 11	6 8	11 7	6 12	12 0	6 11	11 8	5 2	128 15	18 7
8	Cross short-horn	6	April 16	1,190	10 8	4 8	9 0	8 6	10 4	7 6	11 10	7 8	11 0	8 4	11 10	8 2	12 8	7 0	127 10	18 4
9	Cross short-horn	7	April 13	1,087	14 6	11 2	14 10	9 14	15 8	9 14	14 6	10 7	14 5	8 10	13 0	10 4	15 2	7 8	169 0	24 2
10	Half short-horn	8	April 25	1,278	19 18	12 9	19 12	12 0	20 0	13 8	20 5	11 14	20 0	13 2	21 2	12 10	20 2	10 15	227 7	32 8
			Totals	11,444	142 3	95 1	142 2	89 8	141 11	94 3	144 5	92 14	143 14	97 15	143 11	90 15	147 11	81 10	1,647 11	—
			Means	1,144	14 3	9 8	14 3	8 15	14 3	9 7	14 7	9 5	14 6	9 13	14 6	9 1	14 12	8 3	164 12	23 9

Five Cows.—Unsewaged or Sewaged Italian Rye Grass.

					Tuesday.		Wednesday.		Thursday.		Friday.		Saturday.		Sunday.		Monday.		Total in 7 days.	Per head per day.
Food consumed. Grass { From which Field, Plot, and Crop					Rye, † Crop 4.		Rye, † Crop 4.		Rye, † Crop 4.		Rye, † Crop 4.		Rye, † Crop 4.		Rye, † Crop 4.		Rye, † Crop 4.		—	—
Quantities weighed (tons. cwts. qrs. lbs.)					0 2 2 8		0 4 1 4		0 3 3 14		0 5 0 21		0 5 0 8		0 2 2 13		0 2 2 13		1 6 0 25	0 0 3 0
Oilcake (3 parts cotton & 2 parts rape-cake) (ditto)					0 0 0 25		0 0 0 25		0 0 0 25		0 0 0 25		0 0 0 25		0 0 0 25		0 0 0 25		0 1 2 7	0 0 0 5
1	Cross short-horn	Aged	April 20	1,121	17 14	11 6	18 6	11 9	18 6	12 10	19 12	10 1	18 12	10 14	18 8	14 7	20 8	10 12	213 13	30 9
2	Ayrshire	6	Mar. 15	934	17 0	10 7	16 13	9 2	17 4	10 6	17 11	10 0	17 0	9 2	17 15	10 11	16 13	10 2	190 6	27 3
3	Cross short-horn	Aged	Mar. 1	1,166	15 0	9 2	14 15	9 2	14 8	10 1	16 3	8 3	15 2	9 4	15 1	11 6	15 14	8 10	172 7	24 10
4	Cross short-horn	Aged	April 15	1,295	17 1	10 3	17 1	10 0	16 14	10 8	18 4	9 6	17 15	9 9	18 0	11 0	17 2	8 4	191 3	27 5
5	Cross short-horn	6	Jan. 2	1,234	11 2	7 0	12 0	7 5	11 15	7 2	11 7	7 3	10 10	6 9	13 2	7 14	11 12	7 7	132 8	18 15
			Totals	5,750	78 1	48 2	79 3	47 2	78 15	50 11	83 5	44 13	79 7	45 6	82 10	55 6	82 1	45 3	900 5	—
			Means	1,150	15 10	9 10	15 13	9 7	15 13	10 2	16 11	8 15	15 14	9 1	16 8	11 1	16 7	9 1	180 1	25 12

* In these cases the weights recorded are of an intermediate weighing taken on September 28.
a Other grass was given when unsewaged meadow grass was not available.
† Not experimental.

Table X.—*continued.*

Detailed Record of Food consumed, and Milk yielded, by Cows fed on Unsewaged and Sewaged Meadow Grass, and on Italian Rye Grass, with Oilcake in addition.
Third Season, 1863; 7 days.—October 6 to October 12.

Five Cows.—Unsewaged Meadow Grass. *a*

					Tuesday.		Wednesday.		Thursday.		Friday.		Saturday.		Sunday.		Monday.		Total in 7 days.	Per head per day.
Food consumed. Grass: From which Field, Plot, and Crop					Five-acre, Plot 3, Crop 4.		Ten-acre, Plot 4, Crop 4.		Ten-acre, Plot 4, Crop 4.		Ten-acre, Plot 3, Crop 4.		Ten-acre, Plot 3, Crop 4.		Five-acre, Plot 2, Crop 3.		Five-acre, Plot 2, Crop 3.		—	—
Grass: Quantities weighed (*tons. cwts. qrs. lbs.*)					0 9 3 20		0 5 2 7		0 7 3 9		0 7 3 20		0 11 3 25		0 2 2 6		0 2 2 6		2 8 1 9	0 1 1 15
Oilcake (3 parts cotton & 2 parts rape-cake) (*ditto*)					0 0 0 25		0 0 0 25		0 0 0 25		0 0 0 25		0 0 0 25		0 0 0 25		0 0 0 25		0 1 2 7	0 0 0 5
Yield of Milk, &c. Cows. Nos.	Breed.	Years old.	Dates of Calving.	Weights (Oct. 12) *lbs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	A.M. *lbs. ozs.*	P.M. *lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*
1	Cross short-horn	Aged	May 1	1,123	19 0	12 2	21 7	12 10	20 14	12 12	23 0	12 4	20 6	11 4	20 11	10 12	20 7	12 6	229 15	32 13
2	Cross short-horn	6	Feb. 15	1,246	11 5	7 0	11 1	6 3	10 2	5 13	10 12	5 10	10 1	5 6	8 0	5 10	9 0	5 1	111 0	15 14
3	Cross short-horn	3	April 13	866	14 1	9 4	15 10	9 9	15 7	9 11	15 10	8 12	14 3	13 1	14 2	8 11	14 15	8 13	171 13	24 9
4	Cross short-horn	8	May 20	1,090	22 3	15 14	24 1	14 2	22 1	14 6	23 12	14 4	23 4	14 2	22 1	12 0	22 0	13 4	257 6	36 12
5	Cross short-horn	7	April 17	1,208	15 5	9 11	16 0	9 12	16 4	10 1	17 9	8 9	17 11	9 7	16 6	9 14	17 10	9 0	183 3	26 3
			Totals	5,533	81 14	53 15	88 3	52 4	84 12	52 11	90 11	49 7	85 9	53 4	81 4	46 15	84 0	48 8	953 5	—
			Means	1,107	16 6	10 13	17 10	10 7	16 15	10 9	18 2	9 14	17 2	10 11	16 4	9 6	16 13	9 11	190 11	27 4

Ten Cows.—Sewaged Meadow Grass.

					Tuesday.		Wednesday.		Thursday.		Friday.		Saturday.		Sunday.		Monday.		Total in 7 days.	Per head per day.
Food consumed. Grass: From which Field, Plot, and Crop					Five-acre, Plot 3, Crop 4.		Ten-acre, Plot 4, Crop 4.		Ten-acre, Plot 4, Crop 4.		Ten-acre, Plot 3, Crop 4.		Ten-acre, Plot 3, Crop 4.		Five-acre, Plot 2, Crop 3.		Five-acre, Plot 2, Crop 3.		—	—
Grass: Quantities weighed (*tons. cwts. qrs. lbs.*)					0 19 3 11		0 11 0 13		0 15 2 18		0 15 3 12		1 3 3 22		0 5 0 12		0 5 0 11		4 16 2 15	0 1 1 15
Oilcake (3 parts cotton & 2 parts rape-cake) (*ditto*)					0 0 1 22		0 0 1 22		0 0 1 22		0 0 1 22		0 0 1 22		0 0 1 22		0 0 1 22		0 3 0 14	0 0 0 5
1	Cross short-horn	Aged	Mar. 10	1,190	13 10	9 13	14 8	9 15	14 13	9 9	14 10	9 14	14 0	9 2	14 4	9 6	14 6	10 2	168 0	24 0
2	Cross short-horn	8	June 15	1,360	16 4	11 6	18 2	11 0	17 8	11 0	17 12	11 0	16 13	11 1	16 12	11 0	18 2	11 0	198 12	28 6
3	Cross short-horn	6	Feb. 20	1,168	11 0	8 2	11 0	7 10	11 0	7 14	11 10	8 10	12 5	7 10	11 12	7 0	11 10	7 10	134 13	19 4
4	Cross short-horn	7	Feb. 15	1,077	13 1	9 3	13 14	8 14	13 8	9 8	14 6	9 10	13 7	9 1	13 3	8 10	14 0	9 6	159 11	22 13
5	Ayrshiro - -	8	Feb. 22	1,033	10 3	7 12	10 14	7 6	10 12	7 3	10 12	7 4	10 13	6 12	10 12	7 0	11 10	7 4	126 5	18 1
6	Cross short-horn	6	April 14	1,101	17 6	12 2	18 11	11 2	18 6	11 15	19 8	11 11	20 5	10 14	18 6	11 4	20 6	11 6	213 6	30 8
7	Mongrel - -	Aged	April 12	868	11 0	6 14	12 0	6 12	11 4	7 12	12 4	7 2	12 6	7 0	12 4	7 5	11 12	6 0	131 11	18 13
8	Cross short-horn	6	April 16	1,179	10 11	8 0	10 11	7 4	10 10	7 11	9 11	7 5	10 0	6 12	10 3	6 11	9 0	8 13	123 6	17 10
9	Cross short-horn	7	April 13	1,060	14 2	9 0	13 12	9 7	13 14	10 8	15 0	9 4	14 4	10 2	14 6	9 8	14 3	7 10	165 0	23 9
10	Half short-horn	8	April 25	1,290	19 3	12 14	19 10	11 10	19 2	12 0	20 8	11 10	19 0	13 0	19 6	12 0	18 0	10 3	218 2	31 3
			Totals	11,326	136 8	95 2	143 2	91 0	140 13	95 0	146 1	93 6	143 5	91 6	141 4	89 12	143 1	89 6	1,639 2	—
			Means	1,133	13 10	9 8	14 5	9 2	14 1	9 8	14 10	9 6	14 5	9 2	14 2	9 0	14 5	8 15	163 15	23 7

Five Cows.—Unsewaged or Sewaged Italian Rye Grass.

					Tuesday.		Wednesday.		Thursday.		Friday.		Saturday.		Sunday.		Monday.		Total in 7 days.	Per head per day.
Food consumed. Grass: From which Field, Plot, and Crop					* Rye, Crop 4.		* Rye, Crop 4.		* Ryo, Crop 4.		* Rye, Crop 4.		* Rye, Crop 4.		* Rye, Crop 4.		* Rye, Crop 4.		—	—
Grass: Quantities weighed (*tons. cwts. qrs. lbs.*)					0 4 3 20		0 5 3 16		0 4 3 24		0 4 1 22		0 6 3 7		0 3 1 12		0 3 1 12		1 13 3 1	0 0 3 24
Oilcake (3 parts cotton & 2 parts rape-cako) (*ditto*)					0 0 0 25		0 0 0 25		0 0 0 25		0 0 0 25		0 0 0 25		0 0 0 25		0 0 0 25		0 1 2 7	0 0 0 5
1	Cross short-horn	Aged	April 20	1,088	17 4	11 5	19 15	12 0	20 1	11 0	19 12	12 8	20 5	11 4	19 15	10 11	19 0	11 13	216 13	31 0
2	Ayrshire - -	6	Mar. 15	914	17 6	9 13	17 0	11 5	16 13	9 12	17 15	10 0	17 13	9 0	16 2	9 2	17 10	9 7	189 2	27 0
3	Cross short-horn	Aged	Mar. 1	1,120	14 0	9 8	13 15	9 5	15 4	9 1	14 12	9 8	15 10	8 4	13 0	7 6	14 13	7 0	161 6	23 1
4	Cross short-horn	Aged	April 15	1,220	16 8	11 0	17 1	11 10	18 1	11 4	17 7	11 4	17 12	11 8	17 6	11 1	18 2	11 4	201 4	28 12
5	Cross short-horn	6	Jan. 2	1,200	11 0	7 12	11 5	7 8	10 9	8 8	11 8	6 12	11 5	7 0	10 15	7 7	12 5	7 0	130 11	18 11
			Totals	5,542	76 2	49 6	79 4	51 12	80 12	49 9	81 6	50 0	82 13	47 0	77 6	45 11	81 14	46 8	899 7	—
			Means	1,108	15 3	9 14	15 14	10 6	16 2	9 15	16 4	10 0	16 9	9 6	15 8	9 2	16 6	9 5	179 14	25 11

* Not experimental.

TABLE XI.

SUMMARY of the Weights, Increase (or Loss), and Yield of Milk, of the Cows fed respectively on Unsewaged and Sewaged Meadow Grass, with Oilcake in addition.

Second Season, 1862.

Cows. Nos.	Weights.									Increase (or Loss) in Weight.	Yield of Milk.		
	May 1.	Intermediate. May 15.	May 20.	June 26	Intermediate. July 10.	July 24.	Aug. 21.	Sep 18.	Oct. 16.		First week.	Last week.	Average of the 24 weeks.
THREE COWS.—UNSEWAGED GRASS.*													
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs. ozs.	lbs. ozs.	lbs. ozs.
1	945	966	1,042	1,092	1,087	1,090	1,076	1,066	1,058	113	229 1	148 15	183 13
2	976	1,004	1,054	1,093	1,100	1,127	1,170	1,190	1,219	243	193 9	31 10	119 14
3	884	896	948	976	988	1,011	1,012	1,020	1,058	174	241 2	162 7	192 14
Totals -	2,805	2,866	3,044	3,161	3,175	3,228	3,258	3,276	3,335	530	663 12	343 0	..
Averages -	935	955	1,015	1,054	1,058	1,076	1,086	1,092	1,112	177	221 4	114 5	165 8
TWELVE COWS.—SEWAGED GRASS.													
1	1,143	..	1,178	1,246	1,190	1,192	1,224	1,270	1,288	145	165 2	127 10	143 10
2	1,138	..	1,208	1,262	1,263	1,246	1,237	1,267	1,270	132	179 7	77 11	117 5
3	1,076	..	1,153	1,194	1,204	1,232	1,224	1,288	1,223	147	163 15	66 14	122 14
4	966	..	972	994	983	1,000	973	973	936	– 30	202 7	76 3	131 9
5	1,076	..	1,107	1,158	1,132	1,176	1,158	1,199	1,214	138	177 3	67 0	110 5
6	1,006	..	1,096	1,126	1,118	1,121	1,125	1,150	1,169	163	185 1	127 9	150 14
7†	1,112	..	1,068	1,084	1,099	1,071	1,109	1,106	1,101	– 11	314 3	162 14	220 10
8	723	..	785	797	822	824	834	850	868	145	176 6	128 12	136 7
9	965	..	1,018	1,088	1,082	1,116	1,136	1,232	1,224	259	174 12	118 9	147 3
10	866	..	950	953	918	952	950	960	975	109	245 8	152 0	199 10
11	781	..	835	850	828	854	854	834	830	49	206 3	129 15	154 4
12	984	..	1,090	1,142	1,116	1,162	1,155	1,146	1,098	114	178 0	133 10	145 11
Totals -	11,836	..	12,460	12,894	12,755	12,946	12,979	13,275	13,196	1,360	2,373 3	1,368 11	..
Averages -	986	.	1,038	1,075	1,063	1,079	1,082	1,106	1,099	113	197 12	114 1	148 6

* It should be observed, that from May 1 to May 15, the first crop of unsewaged meadow grass not being ready to cut, the 3 cows had Italian rye-grass, and for 20 days, from August 9 to August 28, in default of unsewaged grass, they had green clover; but the figures given in the last four columns of this Table relate to the whole period, irrespectively of these unavoidable irregularities.

† The No. 7 Cow put up on May 1, which weighed 1,126 lbs., fell ill, and was replaced on May 20 by another, weighing 1,112 lbs., as above entered, and this latter is, for convenience, adopted as the original weight in the calculations for this and the following Table.

Table XII.

Summary of Food consumed, and Milk and Increase yielded, by Cows fed respectively on Unsewaged and Sewaged Meadow Grass, with Oilcake in addition.

Second Season, 1862.

Periods.* Dates.*	No. of Days.	3 Cows.—Unsewaged Grass. Average per head per day. Food consumed. Green Grass.	Oil-cake.	Milk yielded.	Average Increase in weight per head per week.	12 Cows.—Sewaged Grass. Average per head per day. Food consumed. Green Grass.	Oil-cake.	Milk yielded.	Average Increase (or Loss) in weight per head per week.
		lbs.	*lbs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs.*	*lbs.*	*lbs. ozs.*	*lbs. ozs.*
May 2 to May 8 - -	7	152	3	31 10	10 $2\frac{3}{4}$	133	3	28 4	13 0
„ 9 to „ 15 - -	7	158	3	31 4		175	3	26 7	
„ 16 to „ 22 - -	7	206	3	29 9	29 $10\frac{3}{4}$	147	3	25 2	
„ 23 to „ 29 - -	7	158	3	29 7		154	3	25 8	
„ 30 to June 5 - -	7	152	3	28 4	9 12	143	3	23 11	9 $0\frac{3}{4}$
June 6 to „ 12 - -	7	142	3	26 6		145	3	22 11	
„ 13 to „ 19 - -	7	160	3	25 8		89	3	22 2	
„ 20 to „ 26 - -	7	145	3	24 15		114	3	21 1	
„ 27 to July 3 - -	7	104	$3\frac{1}{2}$	24 0	5 $9\frac{1}{4}$	136	$3\frac{1}{2}$	20 14	1 $1\frac{1}{4}$
July 4 to „ 10 - -	7	125	$3\frac{1}{2}$	23 8		137	$3\frac{1}{2}$	21 12	
„ 11 to „ 17 - -	7	79	$4\frac{1}{2}$	22 13		145	$4\frac{1}{2}$	21 7	
„ 18 to „ 24 - -	7	74	$4\frac{1}{2}$	22 2		125	$4\frac{1}{2}$	21 2	
„ 25 to „ 31 - -	7	161	4	23 4	2 8	113	4	21 3	0 11
Aug. 1 to Aug. 7 - -	7	86	0	21 2		112	0	21 0	
„ 8 to „ 14 - -	7	176	4	21 14		125	4	21 1	
„ 15 to „ 21 - -	7	90	4	22 2		139	4	20 13	
„ 22 to „ 28 - -	7	120	4	22 7	1 8	153	4	29 1	6 $2\frac{3}{4}$
„ 29 to Sept. 4 - -	7	99	4	22 0		114	4	19 7	
Sept. 5 to „ 11 - -	7	140	4	22 0		157	4	18 15	
„ 12 to „ 18 - -	7	140	4	21 0		164	4	18 11	
„ 19 to „ 25 - -	7	133	4	20 0	4 $14\frac{3}{4}$	136	4	17 8	−1 $10\frac{1}{4}$
26 t Oct. 2 - -	7	115	5	18 9		153	5	17 5	
Oct. 3 to „ 9 - -	7	98	5	17 8		141	5	16 6	
„ 10 to „ 16 - -	7	117	5	16 5		160	5	16 5	
May 2 to Oct. 16 † -	168	130	$3\frac{5}{8}$	23 10	7 6	138	$3\frac{5}{8}$	21 3	4 $11\frac{1}{4}$

* The dates given are of the "milk yielded," but the periods of the "food consumed" date one day earlier in each case, as also do those of the "average increase (or loss) in weight per head per week."

† It should be observed, that from May 1 to May 15, the first crop of unsewaged meadow grass not being ready to cut, the three cows had Italian rye-grass, and for 20 days, from August 9 to August 28, in default of unsewaged grass, they had green clover; but the figures given in the bottom line of this Table relate to the whole period, irrespectively of these unavoidable irregularities.

Table XIII.

Summary of the Weights, Increase (or Loss), and Yield of Milk, of the Cows fed respectively on Unsewaged Meadow Grass, on Sewaged Meadow Grass, and on Italian Rye Grass (Unsewaged and Sewaged), each for Twelve Weeks alone, and each for Twelve Weeks with Oilcake in addition.

TABLE XIII. - - - - -

SUMMARY of the WEIGHTS, INCREASE (or LOSS), and YIELD of MILK, of the Cows fed ITALIAN RYE GRASS (Unsewaged and Sewaged), each for Twelve

THIRD

Cows. Nos.	Twelve Weeks on Grass alone. Weights. Apr. 27.	May 25.	Inter-mediate. June 8.	June 22.	July 20.	Increase (or Loss) in Weight.	Yield of Milk. First Week.	Last Week.	Average.
									FIVE COWS.—UNSEWAGED
	lbs.	*lbs.*	*lbs.*	*lbs.*	*lbs.*	*lbs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs. ozs.*
1*	1,020	1,064	1,062	1,078	1,114	94	207 12	201 14	216 13
2	1,117	1,184	1,177	1,190	1,226	109	235 14	148 4	178 9
3	746	818	821	804	830	84	200 10	144 1	169 12
4†	1,089	1,096	1,094	1,069	1,09	69	178 0	253 12	231 12
5	1,058	1,112	1,110	1,097	1,142	84	230 0	201 4	222 15
Totals -	5,030	5,274	5,264	5,238	5,404	440	1,052 4	949 3	1,019 13
Averages -	1,006	1,055	1,053	1,048	1,081	88	210 7	189 13	203 15
									TEN COWS.—SEWAGED
1	1,064	1,136	..	1,121	1,154	90	235 2	197 11	210 9
2‡	1,036	1,010	..	1,280	1,384	50	263 3	261 3	263 4
3	1,030	1,060	..	1,066	1,146	116	214 7	174 1	192 7
4	1,036	990	..	996	1,040	4	195 3	163 9	182 2
5	1,002	984	..	1,000	1,029	27	185 9	166 5	174 2
6	880	956	..	958	1,016	136	212 5	202 0	216 3
7	808	838	..	894	892	84	192 0	161 9	182 8
8	960	1,026	..	1,068	1,122	162	159 3	148 0	162 10
9	906	954	..	964	1,046	140	225 10	183 2	213 4
10§	1,320	1,358	..	1,186	1,226	31	164 15	244 9	175 15
Totals -	10,042	10,312	..	10,533	11,055	840	2,047 9	1,902 1	1,973 0
Averages -	1,004	1,031	..	1,053	1,106	84	204 12	190 3	197 5
									FIVE COWS.—UNSEWAGED OR
1	1,066	1,122	..	1,122	1,140	74	286 6	243 14	288 0
2	874	902	..	878	910	36	262 0	192 12	223 13
3*	1,042	1,106	..	1,087	1,130	88	**285 8	165 2	212 11
4	1,185	1,176	..	1,180	1,218	33	280 14	215 7	245 12
5¶	1,114	1,048	..	1,128	1,184	−8	210 1	138 15	138 5
Totals -	5,281	5,354	..	5,395	5,582	223	1,324 13	956 2	1,108 9
Averages -	1,056	1,071	..	1,079	1,116	45	264 15	191 4	221 11

* On May 25, No. 1 cow on unsewaged meadow grass, and No. 3 cow on rye-grass were transposed, and the weights entered in the Table are, from the commencement in each case, those of the newly placed cow.

† The No. 4 cow on unsewaged meadow grass put up at the commencement (April 27) increased 73 lbs. by May 25, but diminished considerably in yield of milk, and as she was obviously fattening, was then replaced by the cow whose weight is entered for that date; and in the columns "increase in weight" and "yield of milk" the results obtained on the two cows, successively, are given.

‡ The No. 2 cow on sewaged meadow grass put up at the commencement (April 27) had lost 54 lbs. by June 22, and being ill was removed June 24, and replaced by the animal whose weight on June 22 is entered for that date; but in the columns "increase in weight" and "yield of milk" the results obtained on the two cows, successively, are given.

§ The No. 10 cow put up at the commencement (April 27) diminished considerably in yield of milk, and slipping her calf about June 22, was then replaced by the cow whose weight is entered under that date; but in the columns "increase in weight" and "yield of milk" the results obtained on the two cows, successively, are given.

- - - - - Table XIII.

respectively on Unsewaged Meadow Grass, on Sewaged Meadow Grass, and on Weeks alone, and each for Twelve Weeks with Oilcake in addition.

Season, 1863.

Twelve Weeks on Grass and Oilcake.										Total 24 Weeks.	
Weights.						Increase (or Loss) in Weight.	Yield of Milk.			Increase in Weight.	Average Yield of Milk per Week.
Intermediate. Aug. 3.	Aug. 17.	Intermediate. Sept. 8.	Sept. 14.	Intermediate. Sept. 28.	Oct. 12.		First Week.	Last Week.	Average.		
Meadow Grass.††											
lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs.	lbs. ozs.
1,138	1,176	1,186	1,199	1,204	1,123	9	220 15	229 15	235 4	103	226 0
1,234	1,253	1,274	1,268	1,272	1,246	20	156 11	111 0	138 6	129	158 8
854	878	890	897	889	866	36	156 10	171 13	169 4	120	169 8
1,118	1,118	1,146	1,141	1,098	1,090	– 2	274 7	257 6	270 6	67	251 1
1,170	1,194	1,267	1,236	1,244	1,208	66	205 1	183 3	195 2	150	209 0
5,514	5,619	5,772	5,741	5,707	5,533	129	1,013 12	953 5	1,008 6	569	1,014 1
1,103	1,124	1,154	1,148	1,141	1,107	26	202 12	190 11	201 11	114	202 13
Meadow Grass.											
..	1,182	..	1,208	..	1,190	36	211 11	168 0	189 13	126	200 3
..	1,384	..	1,394	..	1,360	– 24	263 12	198 12	227 7	26	245 5
..	1,182	..	1,174	..	1,168	22	174 5	134 13	153 3	138	172 13
..	1,070	..	1,090	..	1,077	37	173 5	159 11	160 14	41	171 8
..	1,019	..	1,035	..	1,033	4	173 6	126 5	145 1	31	159 9
..	1,048	..	1,096	..	1,101	85	221 6	213 6	211 7	221	213 13
..	884	..	892	..	868	24	175 14	131 11	149 8	60	166 0
..	1,140	..	1,190	..	1,179	57	153 7	123 6	141 7	219	152 1
..	1,040	..	1,087	..	1,060	14	219 13	165 0	193 14	154	203 9
..	1,260	..	1,278	..	1,290	64	266 12	218 2	244 8	95	210 3
..	11,209	..	11,444	..	11,326	271	2,033 11	1,639 2	1,817 2	1,111	1,895 0
..	1,121	..	1,144	..	1,133	27	203 6	163 15	181 11	111	189 8
Sewaged Italian Rye Grass.											
..	1,156	1,130	1,121	..	1,088	– 52	258 3	216 13	235 11	22	261 14
..	922	952	934	..	914	4	194 2	189 2	195 1	40	209 7
..	1,146	1,169	1,166	..	1,120	– 10	168 8	161 6	171 9	78	192 2
..	1,271	1,299	1,295	..	1,220	2	223 10	201 4	221 2	35	233 7
..	1,195	1,224	1,234	..	1,200	16	147 6	130 14	142 15	8	140 10
..	5,684	5,754	5,750	..	5,542	– 40	991 13	899 7	966 6	183	1,037 8
..	1,137	1,151	1,150	..	1,108	– 8	198 6	179 14	193 4	37	207 8

¶ The No. 5 cow on rye-grass put up at the commencement (April 27), falling very ill, had lost by May 25 144 lbs., and was replaced by another cow whose weight is given under that date; but in the columns "increase in weight" and "yield of milk" the results obtained on the two cows, successively, are given.

** As will be seen by reference to Appendix, Table X. p. 133, the yield of milk of No. 3 cow on rye-grass is only given for four out of the seven days of the first week of the experiment, but in the calculations the yield per diem for the remaining three days is assumed to be the same as that of the average of the ensuing week of the No. 3 cow put up on May 5.

†† From April 27 to June 8, the first crop of unsewaged meadow grass not being ready to cut, the five cows nominally fed on it had Italian rye-grass, and they also received Italian rye-grass from Aug. 2 to Sept. 8 in default of unsewaged grass; but the figures in the columns "increase in weight" and "yield of milk" are irrespective of these unavoidable irregularities.

Table XIV.

Summary of Food consumed, and Milk and Increase yielded, by Cows fed respectively on Unsewaged Meadow Grass, on Sewaged Meadow Grass, and on Italian Rye Grass (Unsewaged and Sewaged), each for Twelve Weeks alone, and each for Twelve Weeks with Oilcake in addition.

Third Season, 1863.

Periods.* Dates.*	No. of Days.	5 Cows.—Unsewaged Meadow Grass. Average per head per day. Food consumed. Green Grass.	Oilcake.	Milk yielded.	Average Increase (or Loss) in weight per head per week.	10 Cows.—Sewaged Meadow Grass. Average per head per day. Food consumed. Green Grass.	Oilcake.	Milk yielded.	Average Increase (or Loss) in weight per head per week.	5 Cows.—Unsewaged or Sewaged Italian Rye Grass. Average per head per day. Food consumed. Green Grass.	Oilcake.	Milk yielded.	Average Increase (or Loss) in weight per head per week.
Twelve Weeks. Grass alone.													
		lbs.	*lbs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs.*	*lbs.*	*lbs. ozs.*	*lbs. ozs.*	*lbs.*	*lbs.*	*lbs. ozs.*	*lbs. ozs.*
April 28 to May 4 -	7	112	..	30 1		113	..	29 4		112	..	37 14	
May 5 to „ 11 -	7	124	..	28 0	15 8	122	..	31 2	6 12	131	..	35 14	−0 4
„ 12 to „ 18 -	7	132	..	28 6		145	..	31 11		133	..	32 10	
„ 19 to „ 25 -	7	126	..	27 8		145	..	29 12		123	..	33 14	
„ 26 to June 1 -	7	109	..	34 0		153	..	29 13		150	..	34 8	
June 2 to „ 8 -	7	127	..	32 6	− 1 $12\frac{3}{4}$	137	..	27 15	1 $3\frac{1}{4}$	168	..	33 3	2 $0\frac{3}{4}$
„ 9 to „ 15 -	7	160	..	30 5		132	..	25 8		187	..	31 10	
„ 16 to „ 22 -	7	113	..	29 9		116	..	24 3		175	..	29 13	
„ 23 to „ 29 -	7	106	..	27 15		140	..	26 3		152	..	27 14	
„ 30 to July 6 -	7	103	..	27 1	8 $4\frac{3}{4}$	170	..	27 11	13 $0\frac{3}{4}$	179	..	27 13	9 $5\frac{1}{2}$
July 7 to „ 13 -	7	50	..	27 3		184	..	28 0		196	..	27 12	
„ 14 to „ 20 -	7	62	..	27 2		158	..	27 3		178	..	27 5	
April 28 to „ 20† -	84	110	..	29 2	7 $5\frac{1}{4}$	143	..	28 3	7 0	157	..	31 11	3 $11\frac{1}{2}$
Twelve Weeks. Grass and Oilcake.													
July 21 to July 27 -	7	67	3	28 15		157	3	29 1		162	3	28 5	
„ 28 to Aug. 3 -	7	54	3	29 11	10 12	179	3	29 9	3 $13\frac{1}{2}$	155	3	28 3	5 $1\frac{1}{2}$
Aug. 4 to „ 10 -	7	87	3	30 8		188	3	28 8		134	3	28 11	
„ 11 to „ 17 -	7	64	3	30 7		176	3	27 5		104	3	28 15	
„ 18 to „ 24 -	7	56	3	30 9		176	3	26 15		95	3	28 6	
„ 25 to „ 31 -	7	50	3	29 0	6 $1\frac{1}{2}$	180	3	25 4	5 14	90	3	28 2	3 $4\frac{3}{4}$
Sept. 1 to Sept. 7 -	7	73	3	27 10		180	3	24 9		119	3	27 9	
„ 8 to „ 14 -	7	110	3	28 2		196	3	24 5		69	3	27 5	
„ 15 to „ 21 -	7	99	5	28 2		149	5	24 13		128	5	27 5	
„ 22 to „ 28 -	7	113	5	27 9	−10 $6\frac{1}{2}$	173	5	24 3	− 2 $15\frac{1}{4}$	92	5	27 1	−10 $6\frac{1}{2}$
„ 29 to Oct. 5 -	7	155	5	27 14		155	5	23 9		84	5	25 12	
Oct. 6 to „ 12 -	7	155	5	27 4		155	5	23 7		108	5	25 11	
July 21 to „ 12† -	84	90	$3\frac{2}{3}$	28 13	2 $2\frac{1}{2}$	172	$3\frac{2}{3}$	25 15	2 $4\frac{1}{2}$	112	$3\frac{2}{3}$	27 10	− 0 $10\frac{3}{4}$
Twenty-four Weeks. First 12 Weeks, Grass alone. Second 12 Weeks, Grass and Oilcake.													
April 28 to Oct. 12† -	168	100	$1\frac{5}{6}$	28 15	4 $11\frac{3}{4}$	158	$1\frac{5}{6}$	27 1	4 10	134	$1\frac{5}{6}$	29 10	1 $8\frac{1}{2}$

* The dates given are of the "milk yielded," but the periods of the "food consumed" date one day earlier in each case as also do those of the "average increase (or loss) in weight per head per week."

† From April 27 to June 8, the first crop of unsewaged meadow grass not being ready to cut, the five cows nominally fed on it had Italian rye-grass; and they also received Italian rye-grass from Aug. 2 to Sept. 8 in default of unsewaged meadow grass, but the figures in those lines relate to the whole period, irrespectively of these unavoidable irregularities.

Table XV.

Results of the Analyses of 17 Samples of Sewage-water collected in the Five-acre Field.

Second Season 1861–2 ; November 1861—October 1862 inclusive.

—	Grains per Gallon.																	
	1861.		1862.															
	Nov.	Dec.	Jan.	Feb.	March	April	May		June	July		August		September		October		Mean; 17 Samples.
	4–6.	17 & 18.	6–8.	3–5.	3–5.	3–5.	8–10.	22–24.	5–7.	10–12.	21–26.	4–9.	20 & 21.	1 & 2.	22 & 23.	—	13 & 14.	
Sample numbers - -	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.
Organic matter, In solution -	11·60	10·70	8·90	8·40	11·19	6·20	6·82	10·10	7·55	6·60	6·10	7·80	9·78	9·00	8·69	7·00	6·70	8·42
Organic matter, In suspension	25·60	39·30	20·50	11·80	16·05	9·25	20·35	10·90	15·10	13·30	19·70	12·70	14·74	17·70	19·86	9·60	7·63	16·71
Organic matter, Total -	37·20	50·00	29·40	20·20	27·24	15·45	27·17	21·00	22·65	19·90	25·80	20·50	24·52	26·70	28·55	16·60	14·33	25·13
Inorganic matter, In solution -	47·20	43·00	33·30	30·60	27·21	34·35	31·20	34·60	28·25	27·60	40·30	32·70	36·52	42·40	38·55	33·75	33·51	35·00
Inorganic matter, In suspension	21·00	10·80	12·30	11·40	14·77	9·65	55·15	22·60	32·35	22·40	22·70	19·10	30·02	22·20	28·13	14·70	13·05	21·31
Inorganic matter, Total -	68·20	53·80	45·60	42·00	41·98	44·00	86·35	57·20	60·60	50·00	63·00	51·80	66·54	64·60	66·68	48·45	46·56	56·31
Total in solution -	58·80	53·70	42·20	39·00	38·40	40·55	38·02	44·70	35·80	34·20	46·40	40·50	46·30	51·40	47·24	40·75	40·21	43·42
Total in suspension -	46·60	50·10	32·80	23·20	30·82	18·90	75·50	33·50	47·45	35·70	42·40	31·80	44·76	39·90	47·99	24·30	20·68	38·02
Total solid matter	105·40	103·80	75·00	62·20	69·22	59·45	113·52	78·20	83·25	69·90	88·80	72·30	91·06	91·30	95·23	65·05	60·89	81·44
Ammonia, In solution -	8·71	7·07	3·82	4·18	4·49	2·00	2·16	3·35	2·23	3·00	4·28	5·15	4·63	7·38	5·56	4·39	3·31	4·45
Ammonia, In suspension	2·20	2·23	1·25	1·38	1·99	0·55	1·82	0·78	1·13	0·75	1·97	1·66	1·69	1·23	2·13	0·96	0·89	1·45
Ammonia, Total -	10·91	9·30	5·07	5·56	6·48	2·55	3·98	4·13	3·36	3·75	6·25	6·81	6·32	8·61	7·69	5·35	4·20	5·90
Phosphoric acid - -	2·14	1·53	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Potass - - -	4·95	3·28	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Soda - - - -	9·44	8·53	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

Table XVI.

Results of the Analyses of 17 Samples of Sewage-water collected in the Ten-acre Field.

Second Season 1861–2; November 1861—October 1862 inclusive.

—	Grains per Gallon.																	
	1861.		1862.															Mean; 17 Samples.
	Nov. 4–6.	Dec. 17.	Jan. 7.	Feb. 11.	March 4.	April 1 & 2.	May 5–7.	May 19–21.	June 2–4.	July 7–12.	July 21–26.	August 4–9.	August 18 & 19.	September 1 & 2.	September 22 & 23.	October —	October 13 & 14.	
Sample Numbers	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.
Organic matter. In solution	10·60	9·40	9·00	7·00	9·42	6·68	6·20	7·70	8·10	7·40	6·90	9·40	6·70	8·30	5·80	8·79	8·30	7·98
Organic matter. In suspension	30·40	25·40	16·30	8·90	9·88	8·90	33·80	14·45	20·40	17·30	7·00	14·42	12·37	20·42	26·38	13·84	8·20	16·96
Organic matter. Total	41·00	34·80	25·30	15·90	19·30	15·58	40·00	22·15	28·50	24·70	13·90	23·82	19·07	28·72	32·18	22·63	16·50	24·94
Inorganic matter. In solution	48·40	41·70	33·70	32·40	28·18	34·60	28·21	31·10	31·90	28·80	30·10	33·02	34·59	38·90	32·30	35·52	31·70	33·83
Inorganic matter. In suspension	30·65	19·30	8·10	5·80	3·02	6·35	61·10	21·05	26·75	26·90	19·90	15·86	15·34	17·08	37·93	20·12	11·80	20·42
Inorganic matter. Total	79·05	61·00	41·80	38·20	31·20	40·95	89·31	52·15	58·65	55·70	50·00	48·88	49·93	55·98	70·23	55·64	43·50	51·25
Total in solution	59·00	51·10	42·70	39·40	37·60	41·28	34·41	38·80	40·00	36·20	37·00	42·42	41·29	47·20	38·10	44·31	40·00	41·81
Total in suspension	61·05	44·70	24·40	14·70	12·90	15·25	94·90	35·50	47·15	44·20	26·90	30·28	27·71	37·50	64·31	33·96	20·00	37·38
Total solid matter	120·05	95·80	67·10	54·10	50·50	56·53	129·31	74·30	87·15	80·40	63·90	72·70	69·00	84·70	102·41	78·27	60·00	79·19
Ammonia. In solution	8·63	6·25	4·28	4·25	4·56	1·75	3·69	3·06	3·16	3·60	4·38	4·74	4·86	7·09	4·69	4·39	3·27	4·51
Ammonia. In suspension	2·75	1·42	1·51	0·90	0·94	0·96	2·75	1·09	1·52	2·04	1·49	0·82	0·78	1·07	2·76	1·73	0·63	1·48
Ammonia. Total	11·38	7·67	5·79	5·15	5·50	2·71	6·44	4·15	4·68	5·64	5·87	5·56	5·64	8·16	7·45	6·12	3·90	5·99
Phosphoric acid	2·39	1·15	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Potass	4·63	3·40	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Soda	10·79	8·83	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

TABLE XVII.

COMPARATIVE and Average Composition of the Sewage-water collected in the Two Fields.

Second Season 1861–2; November 1861.—October 1862 inclusive.

—	Grains per Gallon.																								
	1861.				1862.																				Average for the 12 months in the two fields.
	November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.		October.		
	5-acre field.	10-acre field.	5-acre field.	10-acre field.	5-acre field.	10-acre field.	5-acre field.	10-acre field.	5-acre field.	10-acre field.	5-acre field.	10-acre field.	5-acre field.	10-acre field.	5-acre field.	10-acre field.	5-acre field.	10-acre field.	5-acre field.	10-acre field.	5-acre field.	10-acre field.	5-acre field.	10-acre field.	
Number of Analyses	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1	2	2	2	2	2	2	2	2	34
	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.
Organic matter. In solution	11·60	10·60	10·70	9·40	8·90	9·00	8·40	7·00	11·19	9·42	6·20	6·68	8·46	6·95	7·55	8·10	6·35	7·15	8·79	8·05	8·85	7·05	6·85	8·55	8·41
Organic matter. In suspension	25·60	30·40	39·30	25·40	20·50	16·30	11·80	8·90	16·05	9·88	9·25	8·90	15·63	24·13	15·10	20·40	16·50	12·15	13·72	13·40	18·78	23·40	8·62	11·02	17·30
Organic matter. Total	37·20	41·00	50·00	34·80	29·40	25·30	20·20	15·90	27·24	19·30	15·45	15·58	24·09	31·08	22·65	28·50	22·85	19·30	22·51	21·45	27·63	30·45	15·47	19·57	25·71
Inorganic matter. In solution	47·20	48·40	43·00	41·70	33·30	33·70	30·60	32·40	27·21	28·18	34·35	34·60	32·90	29·66	28·25	31·90	33·95	29·45	34·61	33·81	40·48	35·60	33·63	33·61	34·69
Inorganic matter. In suspension	21·00	30·65	10·80	19·30	12·30	8·10	11·40	5·80	14·77	3·02	9·65	6·35	38·88	41·07	32·35	26·75	22·55	23·40	24·56	15·60	25·16	27·51	13·88	15·96	19·20
Inorganic matter. Total	68·20	79·05	53·80	61·00	45·60	41·80	42·00	38·20	41·98	31·20	44·00	40·95	71·78	70·73	60·60	58·65	56·50	52·85	59·17	49·41	65·64	63·11	47·51	49·57	53·89
Total in solution	58·80	59·00	53·70	51·10	42·20	42·70	39·00	39·40	38·40	37·60	40·55	41·28	41·36	36·61	35·80	40·00	40·30	36·60	43·40	41·86	49·33	42·65	40·48	42·16	43·10
Total in suspension	46·60	61·05	50·10	44·70	32·80	24·40	23·20	14·70	30·82	12·90	18·90	15·25	54·51	65·20	47·45	47·15	39·05	35·55	38·28	29·00	43·94	50·91	22·50	26·98	36·50
Total solid matter	105·40	120·05	103·80	95·80	75·00	67·10	62·20	54·10	69·22	50·50	59·45	56·53	95·87	101·81	83·25	87·15	79·35	72·15	81·68	70·86	93·27	93·56	62·98	69·14	79·60
Ammonia. In solution	8·71	8·63	7·07	6·25	3·82	4·28	4·18	4·25	4·49	4·56	2·00	1·75	2·76	3·38	2·23	3·16	3·64	3·99	4·89	4·80	6·47	5·89	3·85	3·83	4·54
Ammonia. In suspension	2·20	2·75	2·23	1·42	1·25	1·51	1·38	0·90	1·99	0·94	0·55	0·96	1·30	1·92	1·13	1·52	1·36	1·77	1·68	0·80	1·68	1·92	0·93	1·18	1·47
Ammonia. Total	10·91	11·38	9·30	7·67	5·07	5·79	5·56	5·15	6·48	5·50	2·55	2·71	4·06	5·30	3·36	4·68	5·00	5·76	6·57	5·60	8·15	7·81	4·78	5·01	6·01

TABLE XVIII.

RESULTS of the Analyses of 13 Samples of Sewage-water collected in the Five-acre Field.

Third Season 1862–3; November 1862—May 1863 inclusive.

—	Grains per Gallon.													
	1862.				1863.									Mean; 13 Samples.
	November		December		January		February		March		April 6, 8, & 9.	May		
	6–8.	20–22.	4–6.	18–20.	8–10.	22–24.	5–7.	19–21.	2, & 4–7.	16, & 18–21.		4–6.	18–20.	
Sample numbers	1	2	3	4	5	6	7	8	9	10	11	12	13	
	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.
Organic matter. In solution	7·65	7·62	7·32	8·40	7·50	9·90	6·70	5·10	5·60	8·00	6·80	6·75	7·35	7·28
Organic matter. In suspension	25·30	28·40	27·44	13·20	12·40	16·50	11·40	28·55	35·10	14·60	22·35	20·45	13·70	20·72
Organic matter. Total	32·95	36·02	34·76	21·60	19·90	26·40	18·10	33·65	40·70	22·60	29·15	27·20	21·05	28·00
Inorganic matter. In solution	29·75	35·00	31·98	33·22	31·00	34·10	28·35	31·50	33·65	34·10	32·85	41·55	38·00	33·47
Inorganic matter. In suspension	44·02	34·33	40·48	18·22	27·05	29·80	16·65	57·55	64·35	26·45	33·25	17·50	27·50	33·63
Inorganic matter. Total	73·77	69·33	72·46	51·44	58·05	63·90	45·00	89·05	98·00	60·55	66·10	59·05	65·50	67·10
Total in solution	37·40	42·62	39·30	41·62	38·50	44·00	35·05	36·60	39·25	42·10	39·65	48·30	45·35	40·75
Total in suspension	69·32	62·73	67·92	31·42	39·45	46·30	28·05	86·10	99·45	41·05	55·60	37·95	41·20	54·35
Total solid matter	106·72	105·35	107·22	73·04	77·95	90·30	63·10	122·70	138·70	83·15	95·25	86·25	86·55	95·10
Ammonia. In solution	3·86	5·90	4·19	3·87	1·94	2·24	3·20	4·44	4·86	5·40	4·68	6·49	6·33	4·41
Ammonia. In suspension	1·99	2·24	1·61	1·46	1·20	1·31	0·79	2·58	3·46	1·09	1·43	1·23	1·05	1·65
Ammonia. Total	5·85	8·14	5·80	5·33	3·14	3·55	3·99	7·02	8·32	·49	6·11	7·72	7·38	6·06

TABLE XIX.

RESULTS of the Analyses of 12 Samples of Sewage-water collected in the Ten-acre Field.

Third Season 1862–3; November 1862—May 1863 inclusive.

	Grains per Gallon.												
	1862.				1863.								Mean; 12 Samples.
	November		December		January		February		March		April 7.	May 7 & 8.	
	3–5.	17–19.	1–3.	15–17.	5–7.	19–21	2–4.	16–18.	3	17			
Sample Numbers	1	2	3	4	5	6	7	8	9	10	11	12	
	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.
Organic matter. In solution	6·20	8·80	6·96	8·36	8·60	10·20	4·35	4·35	5·95	7·65	6·35	7·50	7·11
Organic matter. In suspension	19·12	18·50	25·08	15·75	21·85	15·10	16·25	27·65	10·90	7·40	13·75	20·60	17·66
Organic matter. Total	25·32	27·30	32·04	24·11	30·45	25·30	20·60	32·00	16·85	15·05	20·10	28·10	24·77
Inorganic matter. In solution	34·50	33·50	31·90	28·00	26·30	31·90	29·15	32·50	29·85	31·25	26·20	42·80	31·49
Inorganic matter. In suspension	21·60	24·10	30·33	22·90	34·55	24·50	22·65	37·00	16·70	15·85	30·40	18·50	24·92
Inorganic matter. Total	56·10	57·60	62·23	50·90	60·85	56·40	51·80	69·50	46·55	47·10	56·60	61·30	56·41
Total in solution	40·70	42·30	38·86	36·36	34·90	42·10	33·50	36·85	35·80	38·90	32·55	50·30	38·60
Total in suspension	40·72	42·60	55·41	38·65	56·40	39·60	38·90	64·65	27·60	23·25	44·15	39·10	42·58
Total solid matter	81·42	84·90	94·27	75·01	91·30	81·70	72·40	101·50	63·40	62·15	76·70	89·40	81·18
Ammonia. In solution	4·95	4·90	4·06	2·95	1·91	2·53	3·10	4·60	4·22	5·56	3·41	6·40	4·05
Ammonia. In suspension	1·72	1·65	1·66	1·03	1·46	1·13	0·77	2·84	1·12	0·84	1·63	1·28	1·43
Ammonia. Total	6·67	6·55	5·72	3·98	3·37	3·66	3·87	7·44	5·34	6·40	5·04	7·68	5·48

TABLE XX.

RESULTS of the Analyses of 10 Mixed Samples of Sewage-water, each collected partly in the Five-acre and partly in the Ten-acre Field. Third Season 1863 ; June—October inclusive.

—	Grains per Gallon. 1863. June 1–6.	June 15–19.	July 6–10.	July 20–24.	August 3–7.	August 17–21.	September 7–11.	September 21–25.	October 5–9.	October 19–24.	Mean 10 Samples.
Sample Numbers	1	2	3	4	5	6	7	8	9	10	
	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.
Organic matter. In solution	8·50	7·15	9·10	9·00	13·00	9·90	9·30	8·50	11·10	11·70	9·73
Organic matter. In suspension	28·15	18·00	22·00	36·80	24·30	34·40	76·30	31·60	52·10	36·10	35·97
Organic matter. Total	36·65	25·15	31·10	45·80	37·30	44·30	85·60	40·10	63·20	47·80	45·70
Inorganic matter. In solution	45·70	38·15	46·20	43·20	40·50	52·10	47·30	54·40	54·10	53·50	47·52
Inorganic matter. In suspension	43·50	23·65	36·20	21·00	33·10	25·10	137·00	49·60	61·80	38·40	46·93
Inorganic matter. Total	89·20	61·80	82·40	64·20	73·60	77·20	184·30	104·00	115·90	91·90	94·45
Total in solution	54·20	45·30	55·30	52·20	53·50	62·00	56·60	62·90	65·20	65·20	57·25
Total in suspension	71·65	41·65	58·20	57·80	57·40	59·50	213·30	81·20	113·90	74·50	82·90
Total solid matter	125·85	86·95	113·50	110·00	110·90	121·50	269·90	144·10	179·10	139·70	140·15
Ammonia. In solution	7·73	5·27	7·23	6·46	6·75	7·47	7·40	10·21	9·76	8·37	7·66
Ammonia. In suspension	2·75	0·65	1·98	3·79	2·57	1·84	4·74	2·35	3·05	2·77	2·65
Ammonia. Total	10·48	5·92	9·21	10·25	9·32	9·31	12·14	12·56	12·81	11·14	10·31

TABLE XXI.

COMPARATIVE and average Composition of the Sewage-water collected in the Two Fields.

Third Season 1862-3; November 1862—October 1863 inclusive.

	Grains per Gallon.																										
	1862.						1863.																				Average for the 12 months in the two fields.
	November.			December.			January.			February.			March.			April.			May.			June.	July.	Aug.	Sept.	Oct.	
——	5-acre field.	10-acre field.	Mean.	5-acre field.	10-acre field.	Mean.	5-acre field.	10-acre field.	Mean.	5-acre field.	10-acre field.	Mean.	5-acre field.	10-acre field.	Mean.	5-acre field.	10-acre field.	Mean.	5-acre field.	10-acre field.	Mean.	Mixed; 5 and 10-acre fields.	Mixed; 5 and 10-acre fields.	Mixed; 5 and 10-acre fields.	Mixed; 5 and 10-acre fields.	Mixed; 5 and 10-acre fields.	
Number of Analyses -	2	2	4	2	2	4	2	2	4	2	2	4	2	2	4	1	1	2	2	1	3	2	2	2	2	2	35
	Grs.	Grs.	Grs.	Grs.	Grs.	Grs.	Grs.	Grs.	Grs.	Grs.	Grs.	Grs.	Grs.	Grs.	Grs.	Grs.	Grs.	Grs.	Grs.	Grs.	Grs.	Grs.	Grs.	Grs.	Grs.	Grs.	Grs.
Organic matter. In solution -	7·64	7·50	7·57	7·86	7·66	7·76	8·70	9·40	9·05	5·90	4·35	5·12	6·80	6.80	6·80	6·80	6·35	6·58	7·05	7·50	7·28	7·83	9·05	11·45	8·90	11·40	8·23
Organic matter. In suspension -	26·85	18·81	22·83	20·32	20·42	20·37	14·45	18·48	16·47	19·98	21·95	20·97	24·85	9·15	17·00	22·35	13·75	18·05	17·08	20·60	18·84	23·07	29·40	29·35	53·95	44·10	26·20
Organic matter. Total -	34·49	26·31	30·40	28·18	28·08	28·13	23·15	27·88	25·52	25·88	26·30	26·09	31·65	15·95	23·80	29·15	20·10	24·63	24·13	28·10	26·12	30·90	38·45	40·80	62·85	55·50	34·43
Inorganic matter. In solution -	32·38	34·00	33·19	32·60	29·95	31·27	32·55	29·10	30·82	29·93	30·83	30·38	33·88	30·55	32·22	32·85	26·20	29·52	39·78	42·80	41·29	41·93	44·70	46·30	50·85	53·80	38·86
Inorganic matter. In suspension -	39·17	22·85	31·01	29·35	26·62	27·99	28·43	29·53	28·98	37·10	29·82	33·46	45·40	16·28	30·84	33·25	30·40	31·83	22·50	18·50	20·50	33·57	28·60	29·10	93·30	50·10	36·60
Inorganic matter. Total -	71·55	56·85	64·20	61·95	56·57	59·26	60·98	58·63	59·80	67·03	60·65	63·84	79·28	46·83	63·06	66·10	56·60	61·35	62·28	61·30	61·79	75·50	73·30	75·40	144·15	103·90	75·46
Total in solution - -	40·02	41·50	40·76	40·46	37·61	39·03	41·25	38·50	39·87	35·83	35·18	35·50	40·68	37·35	39·02	39·65	32·55	36·10	46·83	50·30	48·57	49·76	53·75	57·75	59·75	65·20	47·09
Total in suspension - -	66·02	41·66	53·84	49·67	47·04	48·36	42·88	48·01	45·45	57·08	51·77	54·43	70·25	25·43	47·84	55·60	44·15	49·88	39·58	39·10	39·34	56·64	58·00	58·45	147·25	94·20	62·80
Total solid matter -	106·04	83·16	94·60	90·13	84·65	87·39	84·13	86·51	85·32	92·91	86·95	89·93	110·93	62·78	86·86	95·25	76·70	85·98	86·41	89·40	87·91	106·40	111·75	116·20	207·00	159·40	109·89
Ammonia. In solution -	4·88	4·93	4·90	4·08	3·51	3·77	2·09	2·22	2·16	3·82	3·85	3·84	5·13	4·89	5·01	4·68	3·41	4·05	6·41	6·40	6·41	6·50	6·85	7·11	8·81	9·07	5·70
Ammonia. In suspension -	2·12	1·68	1·90	1·54	1·34	1·44	1·26	1·30	1·28	1·69	1·81	1·75	2·28	0·98	1·63	1·43	1·63	1·53	1·14	1·28	1·21	1·70	2·88	2·21	3·54	2·91	2·00
Ammonia. Total -	7·00	6·61	6·80	5·57	4·85	5·21	3·35	3·52	3·44	5·51	5·66	5·59	7·41	5·87	6·64	6·11	5·04	5·58	7·55	7·68	7·62	8·20	9·73	9·32	12·35	11·98	7·70

Table XXII.

Results of the Analyses of 8 Samples of Drainage-water collected in the Five-acre Field.

Second Season 1862; May—October inclusive.

—	Grains per Gallon. 1862. May 8-10.	July 21-26.	August 4-9.	August 20 and 21.	September 1 & 2.	September 22 & 23.	October —	October 13 & 14.	Mean: 8 Samples.
Sample Numbers	1	2	3	4	5	6	7	8	
	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.
Organic matter: In solution	5·50	10·50	8·50	6·04	6·10	6·70	8·20	5·90	7·18
Organic matter: In suspension	*	*	2·49	2·65	1·90	2·70	1·00	0·42	1·40
Organic matter: Total	5·50	10·50	10·99	8·69	8·00	9·40	9·20	6·32	8·58
Inorganic matter: In solution	25·20	31·70	34·21	36·94	39·90	39·00	35·00	34·09	34·50
Inorganic matter: In suspension	*	*	7·48	2·77	0·40	0·90	0·80	2·09	1·81
Inorganic matter: Total	25·20	31·70	41·69	39·71	40·30	39·90	35·80	36·18	36·31
Total in solution	30·70	42·20	42·71	42·98	46·00	45·70	43·20	39·99	41·68
Total in suspension	*	*	9·97	5·42	2·30	3·60	1·80	2·51	3·21
Total solid matter	30·70	42·20	52·68	48·40	48·30	49·30	45·00	42·50	44·89
Ammonia: In solution	0·60	1·03	2·03	1·21	0·39	0·37	0·25	0·54	0·80
Ammonia: In suspension	—	—	0·76	0·23	0·15	0·38	0·23	0·15	0·24
Ammonia: Total	0·60	1·03	2·79	1·44	0·54	0·75	0·48	0·69	1·04

* Too small for estimation.

TABLE XXIII.

RESULTS of the Analyses of 11 Samples of Drainage-water collected in the Ten-acre Field.

Second Season 1862 ; May—October inclusive.

—	Grains per Gallon. 1862. May 5–7.	May 19–21.	June 2–4.	July 7–12.	July 21–26.	August 4–9.	August 18 & 19.	September 1 & 2.	September 22 & 23.	October —	October 13 & 14.	Mean; 11 Samples.
Sample Numbers	1	2	3	4	5	6	7	8	9	10	11	
	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.
Organic matter: In solution	5·70	7·60	9·30	5·10	9·90	6·16	8·92	7·40	7·10	11·41	7·50	7·83
Organic matter: In suspension	*	*	*	*	*	2·13	0·59	1·20	4·20	2·87	4·30	1·39
Organic matter: Total	5·70	7·60	9·30	5·10	9·90	8·29	9·51	8·60	11·30	14·28	11·80	9·22
Inorganic matter: In solution	33·30	36·80	37·30	33·70	32·90	31·02	38·38	46·30	42·00	38·33	38·10	37·10
Inorganic matter: In suspension	*	*	*	*	*	10·81	5·88	8·70	6·90	6·01	2·80	3·74
Inorganic matter: Total	33·30	36·80	37·30	33·70	32·90	41·83	44·26	55·00	48·90	44·34	40·90	40·84
Total in solution	39·00	44·40	46·60	38·80	42·80	37·18	47·30	53·70	49·10	49·74	45·60	44·93
Total in suspension	*	*	*	*	*	12·94	6·47	9·90	11·10	8·88	7·10	5·13
Total solid matter	39·00	44·40	46·60	38·80	42·80	50·12	53·77	63·60	60·20	58·62	52·70	50·06
Ammonia: In solution	1·45	1·64	1·52	1·66	1·66	2·25	1·68	3·79	1·57	1·92	1·18	1·85
Ammonia: In suspension	—	—	—	—	—	0·39	0·60	0·60	1·04	0·54	0·45	0·33
Ammonia: Total	1·45	1·64	1·52	1·66	1·66	2·64	2·28	4·39	2·61	2·46	1·63	2·18

* Too small for estimation.

Table XXIV.

Comparative and average Composition of the Drainage-water collected in the Two Fields.
Second Season 1862; May—October inclusive.

—	May. 5-acre Field.	May. 10-acre Field.	June. 5-acre Field.	June. 10-acre Field.	July. 5-acre Field.	July. 10-acre Field.	August. 5-acre Field.	August. 10-acre Field.	September. 5-acre Field.	September. 10-acre Field.	October. 5-acre Field.	October. 10-acre Field.	Average for the 6 Months in the 2 Fields.
	Grains per Gallon. 1862.												
Number of Analyses	1	2	†	1	1	2	2	2	2	2	2	2	19
	Grains.	Grains.		Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.
Organic matter. In solution	5·50	6·65		9·30	10·50	7·50	7·27	7·54	6·40	7·25	7·05	9·45	7·67
Organic matter. In suspension	*	*		*	*	*	2·57	1·36	2·30	2·70	0·71	3·59	1·20
Organic matter. Total	5·50	6·65		9·30	10·50	7·50	9·84	8·90	8·70	9·95	7·76	13·04	8·87
Inorganic matter. In solution	25·20	35·05		37·30	31·70	33·30	35·58	34·70	39·45	44·15	34·54	38·21	35·38
Inorganic matter. In suspension	*	*		*	*	*	5·12	8·35	0·65	7·80	1·45	4·41	2·53
Inorganic matter. Total	25·20	35·05		37·30	31·70	33·30	40·70	43·05	40·10	51·95	35·99	42·62	37·91
Total in solution	30·70	41·70		46·60	42·20	40·80	42·85	42·24	45·85	51·40	41·59	47·66	43·05
Total in suspension	*	*		*	*	*	7·69	9·71	2·95	10·50	2·16	8·00	3·73
Total solid matter	30·70	41·70		46·60	42·20	40·80	50·54	51·95	48·80	61·90	43·75	55·66	46·78
Ammonia. In solution	0·60	1·55		1·52	1·03	1·66	1·62	1·97	0·38	2·68	0·40	1·55	1·36
Ammonia. In suspension	—	—		—	—	—	0·50	0·49	0·27	0·82	0·19	0·50	0·25
Ammonia. Total	0·60	1·55		1·52	1·03	1·66	2·12	2·46	0·65	3·50	0·59	2·05	1·61

* Too small for estimation.

† No Analysis.

TABLE XXV.

RESULTS of the Analyses of 21 Samples of Drainage-water collected in the Five-acre Field.

Third Season 1862–3 ; November 1862—October 1863 inclusive.

—	GRAINS PER GALLON.																					
	1862.				1863.																	Mean; 21 Samples.
	November		December		January		February		March		April	May	June		July		Aug.	September		October.		
	6–8.	20–22.	4–6.	18–20.	8–10.	22–24.	5–7.	19–21.	2, and 4–7.	16, and 18–21.	6, 8, and 9.	18–20.	1–6.	15–17.	6, 8, and 10.	20–22.	3–5.	7–9.	21–23.	5–7.	19, 21, and 24.	
Sample numbers -	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	
	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.
Organic matter. In solution -	5·65	7·59	9·91	9·25	9·05	9·10	10·60	5·65	4·25	4·20	5·40	10·25	10·30	5·70	11·00	8·20	5·80	6·30	6·00	7·30	5·20	7·46
Organic matter. In suspension	0·47	1·36	2·22	1·30	2·30	*	0·40	0·20	*	*	..	2·25	0·35	0·85	2·95	3·30	7·80	0·10	1·00	1·00	1·70	1·41
Organic matter. Total -	6·12	8·95	12·13	10·55	11·35	9·10	11·00	5·85	4·25	4·20	5·40	12·50	10·65	6·55	13·95	11·50	13·60	6·40	7·00	8·30	6·90	8·87
Inorganic matter. In solution -	39·35	38·89	36·02	35·50	29·25	33·10	32·00	34·25	36·80	36·75	34·50	39·30	41·75	35·00	44·30	36·80	44·10	37·20	49·10	49·00	46·60	38·55
Inorganic matter. In suspension	1·58	10·33	2·10	0·30	0·60	*	2·90	1·65	*	*	0·15	2·20	0·20	0·35	4·95	4·80	3·10	2·70	3·20	1·20	2·60	2·14
Inorganic matter. Total -	40·93	49·22	38·12	35·80	29·85	33·10	34·90	35·90	36·80	36·75	34·65	41·50	41·95	35·35	49·25	41·60	47·20	39·90	52·30	50·20	49·20	40·69
Total in solution -	45·00	46·48	45·93	44·75	38·30	42·20	42·60	39·90	41·05	40·95	39·90	49·55	52·05	40·70	55·30	45·00	49·90	43·50	55·10	56·30	51·80	46·01
Total in suspension -	2·05	11·69	4·32	1·60	2·90	*	3·30	1·85	*	*	0·15	4·45	0·55	1·20	7·90	8·10	10·90	2·80	4·20	2·20	4·30	3·55
Total solid matter -	47·05	58·17	50·25	46·35	41·20	42·20	45·90	41·75	41·05	40·95	40·05	54·00	52·60	41·90	63·20	53·10	60·80	46·30	59·30	58·50	56·10	49·56
Ammonia. In solution -	0·33	0·94	1·55	0·94	0·89	0·17	0·85	1·37	0·40	0·64	0·33	1·70	0·43	0·40	0·50	0·90	0·31	0·17	0·30	0·30	0·97	0·69
Ammonia. In suspension	none	0·62	0·04?	0·14	0·19	..	0·32	0·10	..	..	..	..	0·34?	0·03	0·27	0·13	0·07	0·13	0·50	0·27	0·08	0·15
Ammonia. Total -	0·33	1·56	1·59	1·08	1·08	0·17	1·17	1·47	0·40	0·64	0·33	1·70	0·77	0·43	0·77	1·03	0·38	0·30	0·80	0·57	1·05	0·84

* Too small for estimation.

Table XXVI.

Results of the Analyses of 22 Samples of Drainage-water collected in the Ten-acre Field.

Third Season 1862–3; November 1862—October 1863 inclusive.

—	Grains per Gallon.																						
	1862.				1863.																		Mean: 22 Samples.
	November		December		January		February		Mar.	April	May		June		July		August		September		October		
	3–5.	17–19.	1–3.	15–17.	5–7.	19–21.	2–4.	16–18.	3.	7.	7 & 8.	14 & 15.	1–6.	18 & 19.	7 & 9.	23&24.	6 & 7.	20&21.	10&11.	24&25.	8 & 9.	21–24.	
Sample Numbers -	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.
Organic matter. In solution -	10·20	10·20	6·90	7·40	7·90	10·40	5·65	5·50	6·10	5·25	8·80	9·20	7·75	8·50	9·90	8·50	8·60	10·30	7·50	6·30	8·00	6·70	7·98
Organic matter. In suspension	1·85	0·79	4·45	2·32	1·00	1·20	1·95	5·80	1·60	1·85	8·45	0·60	3·90	1·50	3·40	2·50	3·90	5·70	5·00	2·90	6·60	5·10	3·29
Organic matter. Total -	12·05	10·99	11·35	9·72	8·90	11·60	7·60	11·30	7·70	7·10	17·25	9·80	11·65	10·00	13·30	11·00	12·50	16·00	12·50	9·20	14·60	11·80	11·27
Inorganic matter. In solution -	36·60	35·60	38·15	38·40	33·30	33·60	34·05	33·85	34·45	33·40	43·80	45·30	46·75	38·90	50·10	47·20	52·10	31·40	53·20	54·25	53·40	42·00	41·35
Inorganic matter. In suspension	4·20	6·11	4·35	2·10	6·80	2·40	2·85	7·25	3·35	1·90	7·45	0·95	1·20	4·35	6·25	6·00	0·50	6·80	1·90	2·65	5·10	2·10	3·94
Inorganic matter. Total -	40·80	41·71	42·50	40·50	40·10	36·00	36·90	41·10	37·80	35·30	51·25	46·25	47·95	43·25	56·35	53·20	52·60	38·20	55·10	56·90	58·50	44·10	45·29
Total in solution -	46·80	45·80	45·05	45·80	41·20	44·00	39·70	39·35	40·55	38·65	52·60	54·50	54·50	47·40	60·00	55·70	60·70	41·70	60·70	60·55	61·40	48·70	49·33
Total in suspension -	6·05	6·90	8·80	4·42	7·80	3·60	4·80	13·05	4·95	3·75	15·90	1·55	5·10	5·85	9·65	8·50	4·40	12·50	6·90	5·55	11·70	7·20	7·23
Total solid matter -	52·85	52·70	53·85	50·22	49·00	47·60	44·50	52·40	45·50	42·40	68·50	56·05	59·60	53·25	69·65	64·20	65·10	54·20	67·60	66·10	73·10	55·90	56·56
Ammonia. In solution -	1·14	3·40	1·47	1·43	1·08	0·80	1·17	1·50	1·12	0·46	3·87	2·11	3·11	2·00	1·64	1·67	1·95	0·50	2·37	2·06	3·75	2·09	1·85
Ammonia. In suspension	0·75	0·29	0·67	0·13	0·19	0·31	0·20	0·19	0·19	0·19	0·55	..	0·10	0·07	0·57	0·13	0·19	0·37	0·43	0·20	0·89	0·12	0·31
Ammonia. Total -	1·89	3·69	2·14	1·56	1·27	1·11	1·37	1·69	1·31	0·65	4·42	2·11	3·21	2·07	2·21	1·80	2·14	0·87	2·80	2·26	4·64	2·21	2·16

TABLE XXVII.

COMPARATIVE and Average Composition of the Drainage-water collected in the Two Fields.

Third Season 1862–3; November 1862—October 1863 inclusive.

—	Grains per Gallon.																								
	1862.				1863.																				Average for the 12 months in the two fields.
	November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.		October.		
	5-acre Field.	10-acre Field.	5-acre Field.	10-acre Field.	5-acre Field.	10-acre Field.	5-acre Field.	10-acre Field.	5-acre Field.	10-acre Field.	5-acre Field.	10-acre Field.	5-acre Field.	10-acre Field.	5-acre Field.	10-acre Field.	5-acre Field.	10-acre Field.	5-acre Field.	10-acre Field.	5-acre Field.	10-acre Field.	5-acre Field.	10-acre Field.	
Number of Analyses	2	2	2	2	2	2	2	2	2	1	1	1	1	2	2	2	2	2	1	2	2	2	2	2	43
	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.	Gns.
Organic matter. In solution	6·62	10·20	9·58	7·15	9·08	9·15	8·13	5·58	4·22	6·10	5·40	5·25	10·25	9·00	8·00	8·13	9·60	9·20	5·80	9·45	6·15	6·90	6·25	7·35	7·61
Organic matter. In suspension	0·92	1·32	1·76	3·39	1·15	1·10	0·30	3·87	..	1·60	..	1·85	2·25	4·53	0·60	2·70	3·12	2·95	7·80	4·80	0·55	3·95	1·35	5·85	2·40
Organic matter. Total	7·54	11·52	11·34	10·54	10·23	10·25	8·43	9·45	4·22	7·70	5·40	7·10	12·50	13·53	8·60	10·83	12·72	12·15	13·60	14·25	6·70	10·85	7·60	13·20	10·01
In-organic matter. In solution	39·12	36·10	35·76	38·28	31·17	33·45	33·12	33·95	36·78	34·45	34·50	33·40	39·30	44·55	38·37	42·82	40·55	48·65	44·10	41·75	43·15	53·72	47·80	47·70	39·69
In-organic matter. In suspension	5·95	5·16	1·20	3·22	0·30	4·60	2·28	5·05	..	3·35	0·15	1·90	2·20	4·20	0·28	2·78	4·88	6·13	3·10	3·65	2·95	2·28	1·90	3·60	2·96
In-organic matter. Total	45·07	41·26	36·96	41·50	31·47	38·05	35·40	39·00	36·78	37·80	34·65	35·30	41·50	48·75	38·65	45·60	45·43	54·78	47·20	45·40	46·10	56·00	49·70	51·30	42·65
Total in solution	45·74	46·30	45·34	45·43	40·25	42·60	41·25	39·53	41·00	40·55	39·90	38·65	49·55	53·55	46·37	50·95	50·15	57·85	49·90	51·20	49·30	60·62	54·05	55·05	47·30
Total in suspension	6·87	6·48	2·96	6·61	1·45	5·70	2·58	8·92	..	4·95	0·15	3·75	4·45	8·73	0·88	5·48	8·00	9·08	10·90	8·45	3·50	6·23	3·25	9·45	5·36
Total solid matter	52·61	52·78	48·30	52·04	41·70	48·30	43·83	48·45	41·00	45·50	40·05	42·40	54·00	62·28	47·25	56·43	58·15	66·93	60·80	59·65	52·80	66·85	57·30	64·50	52·66
Ammonia. In solution	0·64	2·27	1·25	1·45	0·53	0·94	1·11	1·34	0·52	1·12	0·33	0·46	1·70	2·99	0·41	2·55	0·70	1·66	0·31	1·23	0·24	2·21	0·63	2·92	1·23
Ammonia. In suspension	0·31	0·52	0·09	0·40	0·10	0·25	0·21	0·19	..	0·19	..	0·19	..	0·28	0·19	0·09	0·20	0·35	0·07	0·28	0·31	0·32	0·18	0·51	0·22
Ammonia. Total	0·95	2·79	1·34	1·85	0·63	1·19	1·32	1·53	0·52	1·31	0·33	0·65	1·70	3·27	0·60	2·64	0·90	2·01	0·38	1·51	0·55	2·53	0·81	3·43	1·45

Table XXVIII.

Details of the Sampling, and of the Determinations of Dry Substance and Mineral Matter (Ash), in the Unsewaged and in the Sewaged Meadow Grass.

Second Season, 1862.

Fields.	Plots.	Number of Samples taken.	Weights. In Fresh State. Each Sample.	Weights. In Fresh State. Total.	Weights. Air-dried. Total.		Weights. Air-dried. Taken.	Actual Weights. Air-dried.	Actual Weights. Equal in Fresh State.	Actual Weights. Dry Substance (at 212° Fahr.)	Actual Weights. Mineral Matter (Ash).	Dry in Fresh. Each Expert.	Dry in Fresh. Mean.	Ash in Fresh. Each Expert.	Ash in Fresh. Mean.	Ash in Dry. Each Expert.	Ash in Dry. Mean.
First Crop.																	
			lbs.	lbs.	lbs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.						
Five-acre	1 (Unsewaged)	44	2½	110	35	0	50	12·5	39·286	10·474	0·946	26·66	26·67	2·408	2·406	9·032	9·020
								12·5	39·286	10·480	0·944	26·68		2·403		9·008	
	2 (Sewaged)	25	5	125	32	8	50	12·5	48·077	10·930	0·920	22·73	22·75	1·914	1·920	8·417	8·442
								12·5	48·077	10·940	0·926	22·76		1·926		8·464	
	3 (Sewaged)	17	5	85	14	10	50	12·5	72·650	10·440	1·010	14·37	14·41	1·390	1·390	9·674	9·651
								12·5	72·650	10·490	1·010	14·44		1·390		9·628	
	4 (Sewaged)	23	5	115	20	13	50	12·5	69·069	10·537	0·974	15·26	15·28	1·410	1·424	9·244	9·322
								12·5	69·069	10·565	0·993	15·30		1·438		9·399	
	0* (Unsewaged)	27	2½	67½	17	0	50	12·5	49·632	10·750	0·966	21·66	21·64	1·946	1·946	8·986	8·995
								12·5	49·632	10·730	0·966	21·62		1·946		9·003	
	0* (Unsewaged)	8	2½	20	5	12	50	12·5	43·478	10·256	1·015	23·59	23·62	2·335	2·345	9·897	9·929
								12·5	43·478	10·280	1·024	23·64		2·355		9·961	
Ten-acre	1 (Unsewaged)	34	2½	85	26	8	50	12·5	40·094	10·780	1·013	26·89	26·86	2·527	2·520	9·397	9·380
								12·5	40·094	10·755	1·007	26·82		2·512		9·363	
	2 (Sewaged)	20	5	100	22	12	50	12·5	54·945	10·753	1·010	19·57	19·52	1·838	1·835	9·393	9·398
								12·5	54·945	10·700	1·006	19·47		1·831		9·402	
	3 (Sewaged)	14	5	70	11	4	50	12·5	77·778	10·470	1·190	13·46	13·51	1·530	1·537	11·366	11·370
								12·5	77·778	10·550	1·200	13·56		1·543		11·374	
	4 (Sewaged)	10	5	50	7	14	50	12·5	79·365	10·420	1·293	13·13	13·13	1·629	1·634	12·409	12·443
								12·5	79·365	10·420	1·300	13·13		1·638		12·476	
	0* (Unsewaged	13	2½	32½	3	8	50	12·5	116·071	11·070	1·020	9·54	†9·54	0·879	†0·880	9·214	9·221
								12·5	116·071	11·076	1·022	9·54		0·880		9·227	

* Designated Plot "0" when unmeasured land.

† Although this result is very low, no error in the experiment can be traced; and as most of the samples contributing to it were taken very early in the season, and during wet weather, it is possibly correct.

Table XXVIII.—*continued.*

Details of the Sampling, and of the Determinations of Dry Substance and Mineral Matter (Ash), in the Unsewaged and in the Sewaged Meadow Grass.

Second Season, 1862.

Particulars of Sampling.							Determinations of Dry Substance and Mineral Matter (Ash).									
			Weights.				Actual Weights.				Per-centages.					
			In Fresh State.		Air-dried.						Dry in Fresh.		Ash in Fresh.		Ash in Dry.	
Fields.	Plots.	Number of Samples taken.	Each Sample.	Total.	Total.	Taken.	Air-dried.	Equal in Fresh State.	Dry Substance (212° Fahr.)	Mineral Matter (Ash).	Each Expert.	Mean.	Each Expert.	Mean.	Each Expert.	Mean.
SECOND CROP.																
			lbs.	*lbs.*	*lbs. ozs.*	*ozs.*	*ozs.*	*ozs.*	*ozs.*	*ozs.*						
Five-acre	1 (Unsewaged)	8	2½	20	5 8	50	12·5	45·455	10·338	0·930	22·74	22·75	2·046	2·046	8·996	8·993
							12·5	45·455	10·345	0·930	22·76		2·046		8·990	
	2 (Sewaged)	14	5	70	12 10	50	12·5	69·307	9·986	1·180	14·41	14·31	1·703	1·717	11·817	12·004
							12·5	69·307	9·843	1·200	14·20		1·731		12·191	
	3 (Sewaged)	16	5	80	16 0	50	12·5	62·500	10·278	1·070	16·44	16·42	1·712	1·704	10·411	10·376
							12·5	62·500	10·250	1·060	16·40		1·696		10·341	
	4 (Sewaged)	10	5	50	12 0	50	12·5	52·083	10·085	1·043	19·36	19·39	2·003	2·015	10·342	10·390
							12·5	52·083	10·108	1·055	19·41		2·026		10·437	
	0* (Unsewaged)	30	2½	75	19 6	50	12·5	48·387	10·189	1·256	21·06	21·06	2·596	2·580	12·327	12·249
							12·5	48·387	10·189	1·240	21·06		2·563		12·170	
Ten-acre	1 (Unsewaged)	15	2½	37½	8 4	50	12·5	56·812	10·150	1·200	17·87	17·90	2·112	2·091	11·823	11·683
							12·5	56·812	10·188	1·176	17·93		2·070		11·543	
	2 (Sewaged)	8	5	40	8 0	50	12·5	62·500	10·085	1·160	16·14	16·15	1·856	1·859	11·502	11·512
							12·5	62·500	10·095	1·163	16·15		1·861		11·521	
	3 (Sewaged)	6	5	30	6 6	50	12·414†	58·419	11·180†	1·126	19·14	18·96	1·927	1·917	10·072	10·115
							12·5	58·824	11·046	1·122	18·78		1·907		10·158	
	4 (Sewaged)	13	5	65	12 14	50	12·5	63·107	10·560	1·066	16·73	16·73	1·689	1·685	10·095	10·071
							12·5	63·107	10·550	1·060	16·72		1·680		10·047	

* Designated Plot "0" when unmeasured land.
† 0·086 oz. of dirt was found in this sample, and that weight is therefore deducted.

Table XXVIII.—*continued.*

Details of the Sampling, and of the Determinations of Dry Substance and Mineral Matter (Ash), in the Unsewaged and in the Sewaged Meadow Grass.

Second Season, 1862.

Particulars of Sampling.							Determinations of Dry Substance and Mineral Matter (Ash).									
			Weights.				Actual Weights.				Per-centages.					
			In Fresh state.		Air-dried.						Dry in Fresh.		Ash in Fresh.		Ash in Dry.	
Fields.	Plots,	Number of Samples taken.	Each Sample.	Total.	Total.	Taken.	Air-dried.	Equal in Fresh state.	Dry Substance (at 212° Fahr.)	Mineral Matter (Ash).	Each Expert.	Mean.	Each Expert.	Mean.	Each Expert.	Mean.
Third Crop.*																
			lbs.	*lbs.*	*lbs. ozs.*	*ozs.*	*ozs.*	*ozs.*	*ozs.*	*ozs.*						
Five-acre	2 (Sewaged)	5	5	25	5 10	50	12·5	55·556	10·090	1·345	18·16	18·24	2·421	2·417	12·330	13·247
							12·5	55·556	10·180	1·340	18·32		2·412		13·163	
	3 (Sewaged)	8	5	40	6 8	50	12·5	76·923	9·918	1·390	12·89	12·89	1·807	1·807	14·015	14·017
							12·5	76·923	9·916	1·390	12·89		1·807		14·018	
	4 (Sewaged)	15	5	75	13 3	50	12·5	71·090	10·094	1·274	14·20	14·19	1·792	1·797	12·621	12·665
							12·5	71·090	10·072	1·280	14·17		1·801		12·708	
Ten-acre	2 (Sewaged)	5	5	25	4 10	50	12·5	67·568	9·810	1·240	14·52	14·52	1·835	1·832	12·640	12·624
							12·5	67·568	9·804	1·236	14·51		1·829		12·607	
	3 (Sewaged)	10	5	60	11 0	50	12·5	68·182	9·890	1·170	14·51	14·44	1·716	1·731	11·830	11·987
		1	10				12·5	68·182	9·800	1·190	14·37		1·745		12·143	
	4 (Sewaged)	9	5	45	8 12	50	12·5	64·286	10·146	1·200	15·78	15·80	1·867	1·908	11·827	12·078
							12·5	64·286	10·164	1·253	15·81		1·949		12·328	
Fourth Crop.																
Ten-acre	4 (Sewaged)	2	5	20	8 8	50	12·5	29·412	9·938	1·284	33·79	33·80	4·367	4·390	12·920	12·989
		1	10				12·5	29·412	9·940	1·298	33·80		4·413		13·058	

* A sample was also taken from Plot 1 in the 10-acre field, but very late in the season, and it contained so much of fallen leaves (from trees) that the analysis was not proceeded with.

TABLE XXIX.

Details of the Sampling, and of the Determinations of Dry Substance and Mineral Matter (Ash), in the Unsewaged and in the Sewaged Meadow Grass and Rye-grass.

Third Season, 1863.

Particulars of Sampling.							Determinations of Dry Substance and Mineral Matter (Ash).									
			Weights.				Actual Weights.				Per-centages.					
Fields.	Plots.	Number of Samples taken.	In fresh state. Each Sample.	In fresh state. Total.	Air-dried. Total.	Air-dried. Taken.	Air-dried.	Equal in fresh state.	Dry Substance (at 212° Fahr.)	Mineral Matter (Ash).	Dry in Fresh. Each Expert.	Dry in Fresh. Mean.	Ash in Fresh. Each Expert.	Ash in Fresh. Mean.	Ash in Dry. Each Expert.	Ash in Dry. Mean.
FIRST CROP.																
			lbs.	lbs.	lbs. ozs.	ozs.	ozs.	ozs.	ozs.	ozs.						
Five-acre	1 (Unsewaged)	6	2½	15	6 1	50	12·5	30·925	11·153	0·820	36·06	36·10	2·652	2·878	7·352	7·972
							12·5	30·925	11·175	0·960	36·14		3·104		8·591	
	2 (Sewaged)	11	5	55	13 8	50	12·5	50·926	10·937	1·006	21·48	21·49	1·975	1·973	9·198	9·187
							12·5	50·926	10·942	1·004	21·49		1·971		9·176	
	3 (Sewaged)	8	5	40	8 1	50	12·5	62·012	10·885	1·100	17·55	17·59	1·774	1·782	10·106	10·129
							12·5	62·012	10·935	1·110	17·63		1·790		10·151	
	4 (Sewaged)	10	5	50	9 5	50	12·5	67·115	10·925	1·100	16·28	16·26	1·639	1·662	10·069	10·218
							12·5	67·115	10·901	1·130	16·24		1·684		10·366	
	0* (Unsewaged)	5	2½	12½	3 2½	50	12·5	49·509	11·205	1·050	22·63	22·75	2·121	2·134	9·371	9·382
							12·5	49·509	11·318	1·063	22·86		2·147		9·392	
	00* (Sewaged)	1	5	5	1 2¼	18¼	4·563	19·996	4·090	0·340	20·45	20·49	1·700	1·705	8·313	8·322
							4·563	19·996	4·105	0·342	20·53		1·710		8·331	
Ten-acre	1 (Unsewaged)	12	2½	30	13 4	50	12·5	28·302	11·274	0·807	39·83	39·79	2·851	2·899	7·158	7·286
							12·5	28·302	11·249	0·834	39·75		2·947		7·414	
	2 (Sewaged)	8	5	40	8 7	50	12·5	59·256	10·972	0·909	18·52	18·56	1·534	1·545	8·285	8·325
							12·5	59·256	11·024	0·922	18·60		1·556		8·364	
	3 (Sewaged)	8	5	40	9 2	50	12·5	54·795	10·966	1·096	20·01	20·03	2·000	1·999	9·995	9·983
							12·5	54·795	10·982	1·095	20·04		1·998		9·971	
	4 (Sewaged)	9	5	45	7 9	50	12·5	74·375	10·828	1·144	14·56	14·56	1·538	1·549	10·565	10·639
							12·5	74·375	10·829	1·160	14·56		1·560		10·712	
	0* (Unsewaged)	5	2½	12½	2 6	38	4·75	25·000	4·269	0·370	17·08	17·09	1·480	1·512	8·667	8·850
							4·75	25·000	4·273	0·386	17·09		1·544		9·033	
	0* (Unsewaged)	5	2½	12½	4 14	50	6·25	16·026	5·598	0·486	34·93	34·96	3·033	3·014	8·682	8·621
							6·25	16·026	5·608	0·480	34·99		2·995		8·559	
Rye-grass †	1 (Unsewaged)	6	2½	15	3 12	50	12·5	50·000	10·659	0·976	21·32	21·30	1·952	1·950	9·157	9·157
							12·5	50·000	10·638	0·974	21·28		1·948		9·156	
	0* (Unsewaged)	14	2½	35	8 10	50	12·5	50·725	10·803	0·946	21·30	21·26	1·865	1·859	8·757	8·746
							12·5	50·725	10·763	0·940	21·22		1·853		8·734	

* Unmeasured land; designated Plot 0 when unsewaged, and Plot 00 when sewaged.

† No sewage was applied for the first crop of Plots 2 and 3, and no samples were taken from the Produce.

Table XXIX.—*continued.*

Details of the Sampling, and of the Determinations of Dry Substance and Mineral Matter (Ash), in the Unsewaged and in the Sewaged Meadow Grass and Rye-grass.

Third Season, 1863.

Particulars of Sampling.							Determinations of Dry Substance and Mineral Matter (Ash).									
Fields.	Plots.	Number of Samples taken.	Weights.				Actual Weights.				Per-centages.					
			In Fresh State.		Air-dried.		Air-dried.	Equal in Fresh State.	Dry Substance (at 212° Fahr).	Mineral Matter (Ash).	Dry in Fresh.		Ash in Fresh.		Ash in Dry.	
			Each Sample.	Total.	Total.	Taken.					Each Expert.	Mean.	Each Expert.	Mean.	Each Expert.	Mean.
SECOND CROP.																
			lbs.	*lbs.*	*lbs. ozs.*	*ozs.*	*ozs.*	*ozs.*	*ozs.*	*ozs.*						
Five-acre	1 (Unsewaged)	2	2½	10	4 2	50	12·5	30·303	10·420	1·190	34·39	34·42	3·927	3·818	11·420	11·095
		1	5				12·5	30·303	10·437	1·124	34·44		3·709		10·769	
	2 (Sewaged)	6	5	30	6 5	50	12·5	59·401	10·993	1·192	18·51	18·51	2·007	1·997	10·843	10·789
							12·5	59·401	10·993	1·180	18·51		1·987		10·734	
	3 (Sewaged)	9	5	45	7 12	50	12·5	72·581	10·814	1·130	14·90	14·91	1·557	1·564	10·449	10·489
							12·5	72·581	10·828	1·140	14·92		1·571		10·528	
	4 (Sewaged)	4	5	20	4 2	50	12·5	60·606	10·774	1·007	17·78	17·80	1·662	1·561	9·347	8·771
							12·5	60·606	10·800	0·885	17·82		1·460		8·194	
	*0 (Unsewaged)	4	2½	20	5 10	50	12·5	44·444	10·164	1·198	22·87	22·89	2·696	2·694	11·787	11·766
		2	5				12·5	44·444	10·183	1·196	22·91		2·691		11·745	
	*00 (Sewaged)	1	10	10	2 7¾	39·75	9·938	39·992	8·658	0·962	21·65	21·61	2·405	2·403	11·111	11·118
							9·938	39·992	8·629	0·960	21·57		2·400		11·125	
Ten-acre	1 (Unsewaged)	1	2½	7½	1 9½	25·5	6·375	29·995	5·441	0·670	18·15	18·17	2·234	2·242	12·307	12·342
		1	5				6·375	29·995	5·454	0·675	18·18		2·250		12·376	
	2 (Sewaged)	6	5	30	6 1	50	12·5	61·856	10·932	1·160	17·67	17·66	1·875	1·929	10·611	10·920
							12·5	61·856	10·918	1·226	17·65		1·982		11·229	
	3 (Sewaged)	7	5	35	6 8	50	12 5	67·308	10·940	1·230	16·25	16·25	1·827	1·820	11·243	11·199
							12·5	67·308	10·937	1·220	16·25		1·813		11·155	
	4 (Sewaged)	6	5	30	6 7	49·895†	12·474	58·127	10·927	1·120	18·80	18·82	1·927	1·935	10·250	10·280
							12·474	58·127	10·951	1·129	18·84		1·942		10·310	
	*0 (Unsewaged)	1	2½	17½	5 13	50	12·5	37·631	10·009	1·310	26·60	26·53	3·481	3·069	13·088	11·567
		3	5				12·5	37·631	9·954	1·000	26·45		2·657		10·046	
	*00 (Sewaged)	1	10	10	1 15	31	7·75	39·990	6·868	0·746	17·17	17·15	1·865	1·869	10·862	10·898
							7·75	39·990	6·851	0·749	17·13		1·873		10·933	
Rye-grass	1 (Unsewaged)	7	2½	17½	4 12	50	12·5	46·053	10·909	0·876	23·69	23·70	1·902	1·912	8·030	8·069
							12·5	46·053	10·915	0·885	23·70		1·922		8·108	
	2 (Sewaged)	9	5	45	9 10	50	12·5	58·442	11·004	0·922	18·83	18·81	1·578	1·576	8·379	8·378
							12·5	58·442	10·984	0·920	18·79		1·574		8·376	
	3 (Sewaged)	13	5	65	12 15	50	12·5	62·800	10·978	1·044	17·48	17·52	1·662	1·666	9·510	9·514
							12·5	62·800	11·022	1·049	17·55		1·670		9·517	
	*0 (Unsewaged)	8	2½	20	6 6	50	12·5	39·216	10·854	1·050	27·68	27·59	2·677	2·672	9·674	9·688
							12·5	39·216	10·781	1·046	27·49		2·667		9·702	

* Unmeasured land; designated Plot 0 when unsewaged, and Plot 00 when sewaged.

† 0·105 oz. of dirt was found in the sample, and that weight is therefore deducted.

Table XXIX—*continued.*

Details of the Sampling, and of the Determinations of Dry Substance and Mineral Matter (Ash), in the Unsewaged and in the Sewaged Meadow Grass and Rye-grass.

Third Season, 1863.

Particulars of Sampling.							Determinations of Dry Substance and Mineral Matter (Ash).									
Fields.	Plots.	Number of Samples taken.	Weights.				Actual Weights.				Per-centages.					
			In fresh state.		Air-dried.		Air-dried.	Equal in fresh State.	Dry Substance (at 212° Fahr.)	Mineral Matter (Ash).	Dry in Fresh.		Ash in Fresh.		Ash in Dry.	
			Each Sample.	Total.	Total.	Taken.					Each Expert.	Mean.	Each Expert.	Mean.	Each Expert.	Mean.
THIRD CROP.																
			lbs.	lbs.	lbs. ozs.	ozs.	ozs.	ozs.	ozs.	ozs.						
Five-acre	2 (Sewaged)	5	5	25	5 6	50	12·5	58·140	10·273	1·205	17·67	17·67	2·073	2·046	11·730	11·584
							12·5	58·140	10·265	1·174	17·66		2·019		11·437	
	3 (Sewaged)	5	5	25	3 6	50	12·5	92·593	10·139	1·274	10·95	10·92	1·376	1·374	12·565	12·589
							12·5	92·593	10·070	1·270	10·88		1·372		12·612	
	4 (Sewaged)	6	5	30	6 8	50	12·5	57·692	10·142	1·164	17·58	17·58	2·018	2·023	11·477	11·506
							12·5	57·692	10·143	1·170	17·58		2·028		11·535	
Ten-acre	2 (Sewaged)	5	5	25	3 15	50	12·5	79·355	9·856	1·142	12·42	12·42	1·439	1·448	11·587	11·665
							12·5	79·355	9·845	1·156	12·41		1·457		11·742	
	3 (Sewaged)	6	5	30	5 6	50	12·5	69·767	10·140	1·200	14·53	14·58	1·720	1·734	11·834	11·889
							12·5	69·767	10·206	1·219	14·63		1·747		11·944	
	4 (Sewaged)	8	5	40	7 8	50	12·5	66·667	10·115	1·180	15·17	15·17	1·761	1·761	11·666	11·666
							12·5	66·667	10·115	1·180	15·17		1·761		11·666	
	00* (Sewaged)	1	10	10	2 9½	41½	10·375	39·996	8·459	0·992	21·15	21·12	2·480	2·478	11·727	11·736
							10·375	39·996	8·430	0·990	21·08		2·475		11·744	
Rye-grass	1 (Unsewaged)	8	2½	20	8 14	50	12·5	28·169	10·240	0·705	36·35	36·35	2·503	2·512	6·885	6·910
							12·5	28·169	10·238	0·710	36·34		2·521		6·935	
	2 (Sewaged)	11	5	55	17 6	50	12·5	39·568	10·871	1·091	27·47	27·47	2·757	2·757	10·036	10·036
							12·5	39·568	10·871	1·091	27·47		2·757		10·036	
	3 (Sewaged)	14	5	70	14 4	50	12·5	61·404	11·227	1·190	18·28	18·28	1·938	1·871	10·599	10·235
							12·5	61·404	11·226	1·108	18·28		1·804		9·870	
	0* (Unsewaged)	9	2½	22½	9 14	50	12·5	28·481	10·396	0·840	36·50	36·48	2·949	2·953	8·080	8·095
							12·5	28·481	10·382	0·842	36·45		2·956		8·110	

* Unmeasured land; designated Plot 0 when unsewaged, and Plot 00 when sewaged.

Table XXIX.—*continued.*

Details of the Sampling, and of the Determinations of Dry Substance and Mineral Matter (Ash), in the Unsewaged and in the Sewaged Meadow Grass and Rye-grass.

Third Season, 1863.

Particulars of Sampling.							Determinations of Dry Substance, and Mineral Matter (Ash).									
			Weights.				Actual Weights.				Per-centages.					
			In fresh state.		Air-dried.						Dry in Fresh.		Ash in Fresh.		Ash in Dry.	
Fields.	Plots.	Number of Samples taken.	Each Sample.	Total.	Total.	Taken.	Air-dried.	Equal in Fresh State.	Dry Substance (at 212° Fahr.)	Mineral Matter (Ash).	Each Expert.	Mean.	Each Expert.	Mean.	Each Expert.	Mean.
FOURTH CROP.*																
			lbs.	*lbs.*	*lbs. ozs.*	*ozs.*	*ozs.*	*ozs.*	*ozs.*	*ozs.*						
Five-acre	2 (Sewaged)	2	10	20	3 13	50	12·5	65·565	10·334	1·235	15·76	15·75	1·884	1·876	11·951	11·909
							12·5	65·565	10·323	1·225	15·74		1·868		11·867	
	3 (Sewaged)	4	5	20	3 3	50	12·5	78·419	10·240	1·295	13·06	13·04	1·651	1·693	12·646	12·984
							12·5	78·419	10·209	1·360	13·02		1·734		13·322	
	4 (Sewaged)	8	5	40	6 1	50	12·5	82·467	10·161	1·150	12·32	12·30	1·394	1·447	11·318	11·764
							12·5	82·467	10·131	1·237	12·28		1·500		12·210	
Ten-acre	3 (Sewaged)	3	5	15	2 9	40·805 †	10·201	59·701	8·304	1·035	13·91	13·87	1·733	1·738	12·464	12·531
							10·201	59·701	8·255	1·040	13·83		1·742		12·598	
	4 (Sewaged)	6	5	30	5 0	50	12·5	75·000	10·185	1·270	13·58	13·62	1·693	1·697	12·469	12·457
							12·5	75·000	10·245	1·275	13·66		1·700		12·445	
Rye-grass	1 (Unsewaged)	1	2½	7½	3 0	47·815 ‡	11·954	29·885	9·880	1·130	33·06	33·21	3·781	3·798	11·437	11·435
		1	5				11·954	29·885	9·971	1·140	33·36		3·815		11·433	
	2 (Sewaged)	7	5	35	6 0½	50	12·5	72·542	10·035	0·990	13·83	13·84	1·365	1·372	9·865	9·912
							12·5	72·542	10·042	1·000	13·84		1·379		9·958	
	3 (Sewaged)	9	5	45	10 7	50	12·5	53·890	10·176	1·126	18·88	18·89	2·089	2·093	11·065	11·083
							12·5	53·890	10·180	1·130	18·89		2·097		11·100	
	0§ (Unsewaged)	4	2½	25	6 12	50	12·5	46·296	10·032	1·396	21·67	21·66	3·015	3·020	13·915	13·942
		3	5				12·5	46·296	10·022	1·400	21·65		3·024		13·969	

* A sample weighing 20 lbs. was also taken from Plot 2 in the ten-acre field, but very late in the season, and it contained so much of fallen leaves (from trees) that the analysis was not proceeded with.
† 0·195 oz. of dirt was found in this sample, and that weight is therefore deducted.
‡ 0·185 oz. is deducted from this sample for the same reason.
§ Designated Plot 0 when unmeasured land.

Table XXIX.—*continued.*

Details of the Sampling, and of the Determinations of Dry Substance and Mineral Matter (Ash), in the Unsewaged and in the Sewaged Meadow Grass and Rye-grass.

Third Season, 1863.

Particulars of Sampling.							Determinations of Dry Substance and Mineral Matter (Ash).									
			Weights.				Actual Weights.				Per-centages.					
			In fresh state.		Air-dried.						Dry in Fresh.		Ash in Fresh.		Ash in Dry.	
Fields.	Plots.	Number of Samples taken.	Each Sample.	Total.	Total.	Taken.	Air-dried.	Equal in Fresh State.	Dry Substance (at 212° Fahr.)	Mineral Matter (Ash.)	Each Exper^t.	Mean.	Each Exper^t.	Mean.	Each Exper^t.	Mean.
FIFTH CROP.*																
			lbs.	*lbs.*	*lbs. ozs.*	*ozs.*	*ozs.*	*ozs.*	*ozs.*	*ozs.*						
Five-acre	4 (Sewaged)	1	20	20	3 11	†49·845	12·461	67·576	10·308	1·352	15·25	15·25	2·001	1·986	13·116	13·022
							12·461	67·576	10·304	1·332	15·25		1·971		12·927	
Rye-grass	1 (Unsewaged)	1	20	20	4 11	50	12·5	53·328	10·620	1·562	19·91	19·92	2·929	2·937	14·708	14·741
							12·5	53·328	10·627	1·570	19·93		2·944		14·774	
Rye-grass	2 (Sewaged)	2	5	10	2 0¼	32¼	8·063	39·995	6·717	0·874	16·79	16·75	2·185	2·198	13·012	13·121
							8·063	39·995	6·682	0·884	16·71		2·210		13·230	
Rye-grass	3 (Sewaged)	5	5	25	5 6	50	12·5	58·140	10·345	1·270	17·79	17·76	2·184	2·176	12·276	12·254
							12·5	58·140	10·301	1·260	17·72		2·167		12·232	
SIXTH CROP.‡																
Rye-grass	2 (Sewaged)	2	10	20	4 6	50	12·5	57·143	10·665	1·496	18·66	18·64	2·618	2·613	14·027	14·014
							12·5	57·143	10·642	1·490	18·62		2·607		14·001	
Rye-grass	3 (Sewaged)	2	10	20	4 13½	50	12·5	51·610	10·523	1·540	20·39	20·38	2·984	2·941	14·635	14·431
							12 5	51·610	10·508	1·495	20·36		2·897		14·227	

* Samples were also taken from Plots 2 and 3 in the 5-acre field, from Plots 3 and 4 in the 10-acre field, and from Plot 0 in the rye-grass field, but very late in the season, and they contained so much of fallen leaves (from trees) and some of them were so wet that the analyses were not proceeded with.

† 0·155 oz. of dirt was found in this sample, and that weight is, therefore, deducted.

‡ A sample was taken from Plot 4 in the 5-acre field, but it contained so much of fallen leaves (from trees) that it was thought better not to proceed with the analysis.

TABLE XXX.

SUMMARY of the Per-centages of Dry Substance (at 212° Fahr.), and of Mineral Matter (Ash), in the Unsewaged and the Sewaged Meadow Grass.

Second Season, 1862.

Plots.	Per-centages.											
	Dry Substance in Fresh Grass.				Mineral Matter in Fresh Grass.				Mineral Matter in Dry Substance.			
	1st Crop.	2d Crop.	3d Crop.	4th Crop.	1st Crop.	2d Crop.	3d Crop.	4th Crop.	1st Crop.	2d Crop.	3d Crop.	4th Crop.
Five-acre Field.												
1 (Unsewaged) - -	26·7	22·8	..	..	2·41	2·05	..	..	9·02	8·99	..	..
2 (Sewaged) - -	22·8	14·3	18·2	..	1·92	1·72	2·42	..	8·44	12·00	13·25	..
3 (Sewaged) - -	14·4	16·4	12·9	..	1·39	1·70	1·81	..	9·65	10·38	14·02	..
4 (Sewaged) - -	15·3	19·4	14·2	..	1·42	2·02	1·80	..	9·32	10·39	12·67	..
Ten-acre Field.												
1 (Unsewaged) - -	26·9	17·9	..	..	2·52	2·09	..	..	9·38	11·68	..	..
2 (Sewaged) - -	19·5	16·2	14·5	..	1·84	1·86	1·83	..	9·40	11·51	12·62	..
3 (Sewaged) - -	13·5	19·0	14·4	..	1·54	1·92	1·73	..	11·37	10·12	11·99	..
4 (Sewaged) - -	13·1	16·7	15·8	33·8	1·63	1·69	1·91	4·39	12·44	10·07	12·08	12·99

TABLE XXXI.

SUMMARY of the Per-centages of Dry Substance (at 212° Fahr.), and of Mineral Matter (Ash), in the Unsewaged and the Sewaged Meadow Grass and Rye-grass.
Third Season, 1863.

Plots.	Per-centages.																	
	Dry Substance in Fresh Grass.						Mineral Matter in Fresh Grass.						Mineral Matter in Dry Substance.					
	1st Crop.	2d Crop.	3d Crop.	4th Crop.	5th Crop.	6th Crop.	1st Crop.	2d Crop.	3d Crop.	4th Crop.	5th Crop.	6th Crop.	1st Crop.	2d Crop.	3d Crop.	4th Crop.	5th Crop.	6th Crop.
Five-acre Field.																		
1 (Unsewaged) - -	36·1	34·4	..	..	..	..	2·88	3·82	..	..	..	..	7·97	11·10	..	..	..	..
2 (Sewaged) - -	21·5	18·5	17·7	15·8	..	..	1·97	2·00	2·05	1·88	..	..	9·19	10·79	11·58	11·91	..	..
3 (Sewaged) - -	17·6	14·9	10·9	13·0	..	..	1·78	1·56	1·37	1·69	..	..	10·13	10·49	12·59	12·98	..	..
4 (Sewaged) - -	16·3	17·8	17·6	12·3	15·3	..	1·66	1·56	2·02	1·45	1·99	..	10·22	8·77	11·51	11·76	13·02	..
Ten-acre Field.																		
1 (Unsewaged) - -	39·8	18·2	..	..	..	..	2·90	2·24	..	..	..	..	7·29	12·34	..	..	..	..
2 (Sewaged) - -	18·6	17·7	12·4	..	..	..	1·55	1·93	1·45	..	..	..	8·33	10·92	11·67	..	..	..
3 (Sewaged) - -	20·0	16·3	14·6	13·9	..	..	2·00	1·82	1·73	1·74	..	..	9·98	11·20	11·89	12·53	..	..
4 (Sewaged) - -	14·6	18·8	15·2	13·6	..	..	1·55	1·94	1·76	1·70	..	..	10·64	10·28	11·67	12·46	..	..
Rye-Grass.																		
1 (Unsewaged) - -	21·3	23·7	36·4	33·2	19·9	..	1·95	1·91	2·51	3·80	2·94	..	9·16	8·07	6·91	11·44	14·74	..
2 (Sewaged) - -	*	18·8	27·5	13·8	16·8	18·6	*	1·58	2·76	1·37	2·20	2·61	*	8·38	10·04	9·91	13·12	14·01
3 (Sewaged) - -	*	17·5	18·3	18·9	17·8	20·4	*	1·67	1·87	2·09	2·18	2·94	*	9·51	10·24	11·08	12·25	14·43

* No Sewage was applied for the 1st Crop of Plots 2 and 3, and no Samples were taken from the produce.

Table XXXII.

Showing the Composition (per cent.) of the Unsewaged and the Sewaged Meadow Grass in the *Fresh State*, as weighed.

Second Season, 1862.

—	First Crop.						Second Crop.					Third Crop.			Fourth Crop.
	Unsewaged.			Sewaged.			Unsewaged.		Sewaged.			Sewaged.			Sewaged.
	Plot 0*. (1.)	Plot 0*. (2.)	Plot 1.	Plot 2.	Plot 3.	Plot 4.	Plot 0*.	Plot 1.	Plot 2.	Plot 3.	Plot 4.	Plot 2.	Plot 3.	Plot 4.	Plot 4.
Five-acre Field.															
Nitrogenous substance (N × 6·3)	2·18	1·32	2·39	1·79	1·54	2·31	2·86	1·56	2·48	2·35	2·71	4·35	2·80	2·96	—
Fatty matter (ether extract)	0·56	0·61	0·71	0·54	0·38	0·47	0·83	0·61	0·57	0·67	0·73	0·84	0·51	0·61	—
Woody fibre	6·70	7·68	8·33	7·44	4·69	4·75	6·22	7·05	4·25	4·80	5·68	4·76	3·53	3·80	—
Other non-nitrogenous substances	10·37	11·68	12·66	11·08	6·48	6·42	8·68	11·46	5·31	6·89	8·32	5·92	4·26	5·11	—
Mineral matter (ash)	1·83	2·33	2·58	1·90	1·32	1·33	2·47	2·07	1·70	1·71	1·95	2·37	1·79	1·71	—
Total dry substance	21·64	23·62	26·67	22·75	14·41	15·28	21·06	22·75	14·31	16·42	19·39	18·24	12·89	14·19	—
Water	78·36	76·38	73·33	77·25	85·59	84·72	78·94	77·25	85·69	83·58	80·61	81·76	87·11	85·81	—
	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	—
Ten-acre Field.															
Nitrogenous substance (N × 6·3)	0·97		2·61	2·18	2·30	2·87	—	2·23	2·17	2·19	1·80	2·93	2·74	2·69	6·16
Fatty matter (ether extract)	0·24		0·70	0·54	0·42	0·54	—	0·68	0·71	0·66	0·57	0·68	0·66	0·61	1·49
Woody fibre	2·97		8·28	6·44	4·16	5·21	—	4·67	4·47	5·41	5·03	3·79	3·85	4·30	8·40
Other non-nitrogenous substances	4·55		12·79	9·01	5·30	3·56	—	8·22	6·98	8·77	7·67	5·31	5·41	6·39	13·08
Mineral matter (ash)	0·81		2·48	1·35	1·33	0·95	—	2·10	1·82	1·93	1·66	1·81	1·78	1·81	4·67
Total dry substance	9·54		26·86	19·52	13·51	13·13	—	17·90	16·15	18·96	16·73	14·52	14·44	15·80	33·80
Water	90·46		73·14	80·48	86·49	86·87	—	82·10	83·85	81·04	83·27	85·48	85·56	84·20	66·20
	100·00		100·00	100·00	100·00	100·00	—	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00

* Designated Plot "0" when unmeasured land.

Table XXXIII.

Showing the Composition (per cent.) of the *Dry Substance* of the Unsewaged and the Sewaged Meadow Grass.

Second Season, 1862.

—	First Crop.						Second Crop.					Third Crop.			Fourth Crop.
	Unsewaged.			Sewaged.			Unsewaged.		Sewaged.			Sewaged.			Sewaged.
	Plot 0.* (1.)	Plot 0.* (2.)	Plot 1.	Plot 2.	Plot 3.	Plot 4.	Plot 0.*	Plot 1.	Plot 2.	Plot 3.	Plot 4.	Plot 2.	Plot 3.	Plot 4.	Plot 4.
Five-acre Field.															
Nitrogenous substance (N × 6·3)	10·09	5·59	8·95	7·87	10·66	15·11	13·59	6·86	17·33	14·28	13·96	23·87	21·71	20·89	—
Fatty matter (ether extract)	2·60	2·59	2·68	2·38	2·63	3·10	3·91	2·66	4·00	4·05	3·79	4·62	3·98	4·29	—
Woody fibre	30·97	32·53	31·25	32·68	32·53	31·11	29·54	30·99	29·69	29·26	29·31	26·10	27·37	26·80	—
Other non-nitrogenous substances	47·90	49·45	47·46	48·71	45·00	42·01	41·23	50·38	37·12	41·98	42·90	32·44	33·07	36·00	—
Mineral matter (ash)	8·44	9·84	9·66	8·36	9·18	8·67	11·73	9·11	11·86	10·43	10·04	12·97	13·87	12·02	—
	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	—
Ten-acre Field.															
Nitrogenous substance (N × 6·3)	10·16		9·71	11·17	17·01	21·84	—	12·44	13·46	11·55	10·79	20·19	18·98	17·01	18·22
Fatty matter (ether extract)	2·48		2·61	2·77	3·07	4·10	—	3·78	4·38	3·50	3·41	4·70	4·58	3·86	4·42
Woody fibre	31·13		30·84	33·00	30·81	39·70	—	26·10	27·67	28·52	30·05	26·09	26·62	27·19	24·86
Other non-nitrogenous substances	47·73		47·63	46·16	39·24	27·15	—	45·91	43·22	46·25	45·84	36·55	37·48	40·45	38·70
Mineral matter (ash)	8·50		9·21	6·90	9·87	7·21	—	11·77	11·27	10·18	9·91	12·47	12·34	11·49	13·80
	100·00		100·00	100·00	100·00	100·00	—	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00

* Designated Plot 0 when unmeasured land.

TABLE XXXIV.

SHOWING the Composition (per cent.) of the Unsewaged and the Sewaged Meadow Grass in the *Fresh State*, as weighed.

Third Season, 1863.

—	First Crop.				Second Crop.				Third Crop.			Fourth Crop.			Fifth Crop.
	Un-sewaged.	Sewaged.			Un-sewaged.	Sewaged.			Sewaged.			Sewaged.			Sewaged.
	Plot 1.	Plot 2.	Plot 3.	Plot 4.	Plot 1.	Plot 2.	Plot 3.	Plot 4.	Plot 2.	Plot 3.	Plot 4.	Plot 2.	Plot 3.	Plot 4.	Plot 4.
FIVE-ACRE FIELD.															
Nitrogenous substance ($N \times 6 \cdot 3$)	2·75	2·95	3·05	3·95	4·44	3·07	3·01	3·15	3·30	2·46	3·82	4·63	3·30	3·15	4·91
Fatty matter (ether extract)	1·14	1·09	0·95	0·86	1·48	0·98	0·56	0·70	0·95	0·58	0·88	0·59	0·69	0·61	0·77
Woody fibre	10·92	5·38	4·10	3·60	8·87	5·24	4·32	5·57	4·41	2·80	4·38	3·41	3·15	3·09	3·13
Other non-nitrogenous substances	18·65	10·11	7·72	6·07	15·74	7·04	5·41	6·59	6·95	3·69	6·42	5·27	4·31	3·97	4·52
Mineral matter (ash)	2·64	1·96	1·77	1·78	3·89	2·18	1·58	1·79	2·06	1·39	2·08	1·85	1·59	1·57	1·92
Total dry substance	36·10	21·49	17·59	16·26	34·42	18·51	14·91	17·80	17·67	10·92	17·58	15·75	13·04	12·30	15·25
Water	63·90	78·51	82·41	83·74	65·58	81·49	85·09	82·20	82·33	89·08	82·42	84·25	86·96	87·70	84·75
	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00
TEN-ACRE FIELD.															
Nitrogenous substance ($N \times 6 \cdot 3$)	3·50	2·40	3·19	2·87	2·17	3·31	3·15	2·92	2·36	2·54	3·02	—	3·54	3·38	—
Fatty matter (ether extract)	1·72	0·94	0·87	0·83	0·82	0·96	0·62	0·65	0·66	0·65	0·70	—	0·70	0·75	—
Woody fibre	12·97	5·52	5·17	3·43	4·72	4·72	4·47	5·66	3·24	3·90	4·26	—	3·17	3·21	—
Other non-nitrogenous substances	18·65	8·13	8·81	5·81	8·16	6·56	6·12	7·63	4·66	5·79	5·38	—	4·75	4·55	—
Mineral matter (ash)	2·95	1·57	1·99	1·62	2·30	2·11	1·89	1·96	1·50	1·70	1·81	—	1·71	1·73	—
Total dry substance	39·79	18·56	20·03	14·56	18·17	17·66	16·25	18·82	12·42	14·58	15·17	—	13·87	13·62	—
Water	60·21	81·44	79·97	85·44	81·83	82·34	83·75	81·18	87·58	85·42	84·83	—	86·13	86·38	—
	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	—	100·00	100·00	—

Table XXXV.

Showing the Composition (per cent.) of the *Dry Substance* of the Unsewaged and the Sewaged Meadow Grass.

Third Season, 1863.

—	First Crop.				Second Crop.				Third Crop.			Fourth Crop.			Fifth Crop.
	Un-sewaged.	Sewaged.			Un-sewaged.	Sewaged.			Sewaged.			Sewaged.			Sewaged.
	Plot 1.	Plot 2.	Plot 3.	Plot 4.	Plot 1.	Plot 2.	Plot 3.	Plot 4.	Plot 2.	Plot 3.	Plot 4.	Plot 2.	Plot 3.	Plot 4.	Plot 4.
Five-acre Field.															
Nitrogenous substance (N×6·3)	7·62	13·71	17·33	24·31	12·88	16·57	20·38	17·71	18·66	22·60	21·71	29·39	25·27	25·59	32·19
Fatty matter (ether extract)	3·16	5·09	5·40	5·27	4·31	5·29	3·73	3·91	5·38	5·30	4·98	3·77	5·33	4·96	5·07
Woody fibre	30·24	25·02	23·34	22·13	25·73	28·31	28·94	31·32	24·97	25·62	24·94	21·65	24·15	24·42	20·51
Other non-nitrogenous substances	51·66	47·06	43·88	37·35	45·73	38·07	36·31	37·02	39·33	33·76	36·51	33·43	33·02	32·24	29·62
Mineral matter (ash)	7·32	9·12	10·05	10·94	11·30	11·76	10·62	10·04	11·66	12·72	11·86	11·76	12·23	12·79	12·61
	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00
Ten-acre Field.															
Nitrogenous substance (N×6·3)	8·81	12·95	15·94	19·75	11·94	18·73	19·42	15·49	18·98	17·46	19·87	—	25·53	24·82	—
Fatty matter (ether extract)	4·32	5·04	4·33	5·69	4·52	5·46	3·79	3·46	5·28	4·46	4·62	—	5·07	5·53	—
Woody fibre	32·59	29·74	25·83	23·54	25·95	26·72	27·50	30·08	26·12	26·76	28·07	—	22·83	23·59	—
Other non-nitrogenous substances	46·87	43·81	43·97	39·92	44·91	37·17	37·66	40·54	37·53	39·68	35·49	—	34·25	33·38	—
Mineral matter (ash)	7·41	8·46	9·93	11·10	12·68	11·92	11·63	10·43	12·09	11·64	11·95	—	12·32	12·68	—
	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	—	100·00	100·00	—

TABLE XXXVI.

SHOWING the Composition (per cent.) of the Unsewaged and the Sewaged Italian Rye-grass in the *Fresh State*, as weighed.

Season 1863.

—	First Crop.	Second Crop.			Third Crop.			Fourth Crop.			Fifth Crop.			Sixth Crop.	
	Un-sewaged.	Un-sewaged.	Sewaged.		Un-sewaged.	Sewaged.		Un-sewaged.	Sewaged.		Un-sewaged.	Sewaged.		Sewaged.	
	Plot 1.	Plot 1.	Plot 2.	Plot 3.	Plot 1.	Plot 2.	Plot 3.	Plot 1.	Plot 2.	Plot 3.	Plot 1.	Plot 2.	Plot 3.	Plot 2.	Plot 3.
Nitrogenous substance (N × 6·3)	2·67	1·94	3·26	2·29	3·05	3·33	2·32	4·95	2·30	3·50	3·63	3·87	3·80	4·60	5·06
Fatty matter (ether extract)	0·77	0·73	0·72	0·37	1·10	0·99	0·59	1·18	0·77	0·73	0·87	0·81	0·75	0·83	1·19
Woody fibre	3·79	6·84	4·49	4·93	10·36	7·70	5·45	8·33	3·88	5·36	4·61	4·20	3·50	4·22	4·42
Other non-nitrogenous substances	12·05	12·28	8·49	8·39	19·28	12·77	8·61	14·97	5·48	7·17	7·87	5·62	7·45	6·33	6·62
Mineral matter (ash)	2·02	1·91	1·85	1·54	2·56	2·68	1·31	3·78	1·41	2·13	2·94	2·25	2·26	2·66	3·09
Total dry substance	21·30	23·70	18·81	17·52	36·35	27·47	18·28	33·21	13·84	18·89	19·92	16·75	17·76	18·64	20·38
Water	78·70	76·30	81·19	82·48	63·65	72·53	81·72	66·79	86·16	81·11	80·08	83·25	82·24	81·36	79·62
	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00

TABLE XXXVII.

SHOWING the Composition (per cent.) of the *Dry Substance* of the Unsewaged and the Sewaged Italian Rye-grass.

Season 1863.

—	First Crop.	Second Crop.			Third Crop.			Fourth Crop.			Fifth Crop.			Sixth Crop.	
	Un-sewaged.	Un-sewaged.	Sewaged.		Un-sewaged.	Sewaged.		Un-sewaged.	Sewaged.		Un-sewaged.	Sewaged.		Sewaged.	
	Plot 1.	Plot 1.	Plot 2.	Plot 3.	Plot 1.	Plot 2.	Plot 3.	Plot 1.	Plot 2.	Plot 3.	Plot 1.	Plot 2.	Plot 3.	Plot 2.	Plot 3.
Nitrogenous substance (N × 6·3)	12·51	8·19	17·33	13·07	8·38	12·12	12·70	14·92	16·63	18·54	18·22	23·11	21·40	24·70	24·82
Fatty matter (ether extract)	3·61	3·07	3·81	2·14	3·03	3·61	3·21	3·54	5·54	3·86	4·39	4·84	4·23	4·44	5·82
Woody fibre	17·79	28·85	23·86	28·13	28·50	28·03	29·83	25·10	28·02	28·36	23·15	25·05	19·72	22·61	21·71
Other non-nitrogenous substances	56·59	51·82	45·15	47·87	53·05	46·50	47·09	45·07	39·58	37·96	39·51	33·57	41·94	33·98	32·50
Mineral matter (ash)	9·50	8·07	9·85	8·79	7·04	9·74	7·17	11·37	10·23	11·28	14·73	13·43	12·71	14·27	15·15
	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00

Table XXXVIII.

Average Composition (per cent.) of the Meadow Grass from each Plot, and of each successive Crop.
Second Season, 1862.

—	Mean Composition, per Cent.															
	Of the Fresh Grass as weighed.								Of the Dry Substance of the Grass.							
	Without, or with different Quantities of Sewage.				In each successive Crop.				Without, or with different Quantities of Sewage.				In each successive Crop.			
	Un-sewaged.	Sewaged.			1st Crop.	2d Crop.	3d Crop.	4th Crop.	Un-sewagod.	Sewaged.			1st Crop.	2d Crop.	3d Crop.	4th Crop.
	Plot 1.	Plot 2.	Plot 3.	Plot 4.					Plot 1.	Plot 2.	Plot 3.	Plot 4.				
Five-acre Field.																
Number of analyses - -	2	3	3	3	4	4	3	—	2	3	3	3	4	4	3	—
Nitrogenous substance (N×6·3) -	1·97	2·87	2·23	2·66	2·01	2·28	3·37	—	7·91	16·36	15·55	16·65	10·65	13·11	22·16	—
Fatty matter (ether extract) -	0·66	0·65	0·52	0·60	0·53	0·64	0·65	—	2·67	3·67	3·55	3·73	2·70	3·62	4·29	—
Woody fibre - - - -	7·69	5·48	4·34	4·75	6·30	5·44	4·03	—	31·12	29·49	29·72	29·07	31·89	29·81	26·76	—
Other non-nitrogenous substances	12·06	7·44	5·88	6·62	9·16	8·00	5·10	—	48·92	39·42	40·02	40·31	45·79	43·10	33·84	—
Mineral matter (ash) - -	2·33	1·99	1·60	1·66	1·78	1·86	1·96	—	9·38	11·06	11·16	10·24	8·97	10·36	12·95	—
Total dry substauce - -	24·71	18·43	14·57	16·29	19·78	18·22	15·11	—								
Water - - - -	75·29	81·57	85·43	83·71	80·22	81·78	84·89	—								
	100·00	100·00	100·00	100·00	100·00	100·00	100·00	—	100·00	100·00	100·00	100·00	100·00	100·00	100·00	—
Ten-acre Field.																
Number of analyses - -	2	3	3	4	4	4	3	1	2	3	3	4	4	4	3	1
Nitrogenous substance)N×6·3) -	2·42	2·43	2·41	3·38	2·49	2·10	2·79	6·16	11·08	14·94	15·85	16·97	14·93	12·06	18·73	18·22
Fatty matter (ether extract) -	0·69	0·64	0·58	0·80	0·55	0·65	0·65	1·49	3·19	3·95	3·72	3·95	3·14	3·77	4·38	4·42
Woody fibre - - - -	6·47	4·90	4·47	5·74	6·02	4·90	3·98	8·40	28·47	28·92	28·65	30·45	33·59	28·09	26·63	24·86
Other non-nitrogenous substances	10·51	7·10	6·49	7·68	7·67	7·91	5·70	13·08	46·77	41·98	40·99	38·03	40·04	45·30	38·16	38·70
Mineral matter (ash) - -	2·29	1·66	1·68	2·27	1·53	1·88	1·80	4·67	10·49	10·21	10·79	10·60	8·30	10·78	12·10	13·80
Total dry substance - -	22·38	16·73	15·63	19·87	18·26	17·44	14·92	33·80								
Water - - - -	77·62	83·27	84·37	80·13	81·74	82·56	85·08	66·20								
	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00

Table XXXIX.

Average Composition (per cent.) of the Meadow Grass from each Plot, and of each successive Crop.

Third Season, 1863.

—	Mean Composition, per Cent.																	
	Of the Fresh Grass as weighed.									Of the Dry Substance of the Grass.								
	Without, or with different Quantities of Sewage.				In each successive Crop.					Without, or with different Quantities of Sewage.				In each successive Crop.				
	Un-sewaged.	Sewaged.			1st Crop.	2d Crop.	3d Crop.	4th Crop.	5th Crop.	Un-sewaged.	Sewaged.			1st Crop.	2d Crop.	3d Crop.	4th Crop.	5th Crop.
	Plot 1.	Plot 2.	Plot 3.	Plot 4.						Plot 1.	Plot 2.	Plot 3.	Plot 4.					
Five-acre Field.																		
Number of analyses	2	4	4	5	4	4	3	3	1	2	4	4	5	4	4	3	3	1
Nitrogenous substance (N×6·3)	3·60	3·49	2·96	3·80	3·17	3·42	3·19	3·69	4·91	10·25	19·58	21·40	24·30	15·74	16·89	20·99	26·75	32·19
Fatty matter (ether extract)	1·31	0·90	0·70	0·76	1·01	0·93	0·80	0·63	0·77	3·73	4·88	4·94	4·84	4·73	4·31	5·22	4·68	5·07
Woody fibre	9·89	4·61	3·59	3·94	6·00	6·00	3·86	3·19	3·13	28·01	24·99	25·51	24·66	25·18	28·59	25·18	23·41	20·51
Other non-nitrogenous substances	17·20	7·34	5·28	5·51	10·64	8·70	5·69	4·52	4·52	48·70	39·47	36·74	34·55	44·99	39·28	36·53	32·90	29·62
Mineral matter (ash)	3·26	2·01	1·58	1·83	2·04	2·36	1·85	1·67	1·92	9·31	11·08	11·41	11·65	9·36	10·93	12·08	12·26	12·61
Total dry substance	35·26	18·35	14·11	15·84	22·86	21·41	15·39	13·70	15·25									
Water	64·74	81·65	85·89	84·16	77·14	78·59	84·61	86·30	84·75									
	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00
Ten-acre Field.																		
Number of analyses	2	3	4	4	4	4	3	2	—	2	3	4	4	4	4	3	2	—
Nitrogenous substance (N 6×3)	2·83	2·69	3·10	3·05	2·99	2·89	2·64	3·46	—	10·38	16·89	19·59	19·98	14·36	16·39	18·77	25·17	—
Fatty matter (ether extract)	1·27	0·85	0·71	0·73	1·09	0·76	0·67	0·73	—	4·42	5·26	4·41	4·83	4·84	4·31	4·79	5·30	—
Woody fibre	8·84	4·49	4·18	4·14	6·77	4·89	3·80	3·19	—	29·27	27·53	25·73	26·32	27·93	27·56	26·98	23·21	—
Other non-nitrogenous substances	13·41	6·45	6·37	5·84	10·35	7·12	5·28	4·65	—	45·89	39·50	38·89	37·33	43·61	40·07	37·57	33·82	—
Mineral matter (ash)	2·03	1·73	1·82	1·78	2·03	2·07	1·67	1·72	—	10·04	10·82	11·38	11·54	9·23	11·67	11·89	12·50	—
Total dry substance	28·98	16·21	16·18	15·54	23·23	17·73	14·06	13·75	—									
Water	71·02	83·79	83·82	84·46	76·77	82·27	85·94	86·25	—									
	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	—	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	—

TABLE XL.

AVERAGE Composition (per cent.) of the Italian Rye-grass from each Plot, and of each successive Crop.

SEASON 1863.

—	Mean Composition, per Cent.																	
	Of the Fresh Grass, as weighed.									Of the Dry Substance of the Grass.								
	Without, or with different Quantities of Sewage.			In each successive Crop.						Without, or with different Quantities of Sewage.			In each successive Crop.					
	Un-sewaged.	Sewaged.								Un-sewaged.	Sewaged.							
	Plot 1.	Plot 2.	Plot 3.	1st Crop.	2d Crop.	3d Crop.	4th Crop.	5th Crop.	6th Crop.	Plot 1.	Plot 2.	Plot 3.	1st Crop.	2d Crop.	3d Crop.	4th Crop.	5th Crop.	6th Crop.
Number of Analyses	5	5	5	1	3	3	3	3	2	5	5	5	1	3	3	3	3	2
Nitrogenous substance (N×6·3)	3·25	3·47	3·39	2·67	2·49	2·90	3·58	3·77	4·83	12·44	18·78	18·11	12·51	12·86	11·07	16·70	20·91	24·76
Fatty matter (ether extract)	0·93	0·82	0·73	0·77	0·61	0·89	0·89	0·81	1·01	3·53	4·45	3·85	3·61	3·01	3·28	4·31	4·49	5·13
Woody fibre	6·79	4·90	4·73	3·79	5·42	7·84	5·86	4·10	4·32	24·68	25·51	25·55	17·79	26·95	28·79	27·16	22·64	22·16
Other non-nitrogenous substances	13·29	7·74	7·65	12·05	9·72	13·55	9·21	6·98	6·47	49·21	39·76	41·47	56·59	48·28	48·88	40·87	38·34	33·24
Mineral matter (ash)	2·64	2·17	2·07	2·02	1·77	2·19	2·44	2·48	2·88	10·14	11·50	11·02	9·50	8·90	7·98	10·96	13·62	14·71
Total dry substance	26·90	19·10	18·57	21·30	20·01	27·37	21·98	18·14	19·51									
Water	73·10	80·90	81·43	78·70	79·99	72·63	78·02	81·86	80·49									
	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00

TABLE XLI.

SHOWING the Composition (per cent.) of the Milk from Cows fed respectively on Unsewaged and Sewaged Meadow Grass, with Oilcake in addition.

Season 1862.

—	Food—Grass and Oilcake.						
	Dates of Collection.						Means.
	May 10.	June 4.	July 2.	Aug. 6.	Sept. 4.	Oct. 1.	
From 3 Cows on Unsewaged Grass.							
Casein - - - - -	3·571	3·209	3·511	3·379	3·682	3·725	3·513
Butter - - - - -	4·085	3·991	3·561	4·132	3·356	3·880	3·834
Sugar of milk, &c. - -	3·969	4·949	4·657	4·331	4·423	4·684	4·502
Mineral matter - - -	0·744	0·713	0·778	0·798	0·757	0·728	0·753
Total solid matter - -	12·369	12·862	12·507	12·640	12·218	13·017	12·602
Water - - -	87·631	87·138	87·493	87·360	87·782	86·983	87·398
	100·000	100·000	100·000	100·000	100·000	100·000	100·000
From 12 Cows on Sewaged Grass.							
Casein - - - - -	3·554	3·324	3·434	3·189	3·651	3·649	3·467
Butter - - - - -	3·750	3·672	3·459	3·281	3·310	3·879	3·559
Sugar of milk, &c. - - -	3·951	4·560	4·658	4·677	4·329	4·463	4·440
Mineral matter - - -	0·761	0·712	0·769	0·763	0·839	0·785	0·771
Total solid matter - -	12·016	12·268	12·320	11·910	12·129	12·776	12·237
Water - - - -	87·984	87·732	87·680	88·090	87·871	87·224	87·763
	100·000	100·000	100·000	100·000	100·000	100·000	100·000

TABLE XLII.

Details of the Sampling, and of the Determinations of Dry Substance, and Mineral Matter (Ash), in the Grass grown in the Fourth Season, 1864, without Sewage.

Particulars of Sampling.								Determinations of Dry Substance, and Mineral Matter (Ash).									
				Weights.				Actual Weights.				Per-centages.					
				In fresh state.		Air-dried.						Dry in Fresh.		Ash in Fresh.		Ash in Dry.	
Fields.	Plots.	How treated in 1861, 1862, and 1863.	Number of Samples taken.	Each Sample.	Total.	Total.	Taken.	Air-dried.	Equal in Fresh State.	Dry Substance (at 212° Fahr.)	Mineral Matter. (Ash.)	Each Expert.	Mean.	Each Expert.	Mean.	Each Expert.	Mean.
First Crop.																	
				lbs.	lbs.	lbs. ozs.	ozs.	ozs.	ozs.	ozs.	ozs.						
Five-acre	1	Unsewaged	2	10	20	8 6	50	12·5	29·851	10·392	0·764	34·81	34·70	2·559	2·569	7·352	7·406
								12·5	29·851	10·323	0·770	34·58		2·579		7·459	
	2	Sewaged	4	5	20	7 5	50	12·5	34·188	10·330	0·790	30·22	30·19	2·311	2·325	7·648	7·703
								12·5	34·188	10·312	0·800	30·16		2·339		7·758	
	3	Sewaged	4	5	20	6 14	50	12·5	36·364	10·250	0·770	28·19	28·12	2·117	2·131	7·512	7·580
								12·5	36·364	10·199	0·780	28·05		2·145		7·648	
	4	Sewaged	4	5	20	5 0	50	12·5	50·000	10·155	0·900	20·31	20·33	1·800	1·810	8·863	8·904
								12·5	50·000	10·173	0·910	20·35		1·820		8·945	
Ten-acre	1	Unsewaged	2	10	20	8 1	50	12·5	31·008	10·348	0·714	33·37	33·36	2·303	2·274	6·900	6·815
								12·5	31·008	10·344	0·696	33·36		2·245		6·729	
	2	Sewaged	1	10	20	7 8	50	12·5	33·333	10·252	0·790	30·76	30·84	2·370	2·376	7·706	7·705
			2	5				12·5	33·333	10·306	0·794	30·92		2·382		7·704	
	3	Sewaged	4	5	20	5 12	50	12·5	43·478	10·312	0·834	23·72	23·63	1·918	1·907	8·088	8·072
								12·5	43·478	10·230	0·824	23·53		1·895		8·055	
	4	Sewaged	4	5	20	5 5	50	12·5	47·059	10·110	0·893	21·48	21·50	1·898	1·905	8·833	8·862
								12·5	47·059	10·124	0·900	21·51		1·912		8·890	
Second Crop.																	
Five-acre	4	Sewaged	1	20	20	13 7	50	12·5	18·605	10·337	0·803	55·56	55·53	4·316	4·292	7·768	7·730
								12·5	18·605	10·323	0·794	55·49		4·268		7·692	

TABLE XLIII.

Results of the Mechanical Analysis of the Rugby Soils.

Composition per Cent.

——	Plot 1.	Plot 2.	Plot 3.	Plot 4.	Mean.
FIVE-ACRE FIELD.					
Stones retained by 1 inch sieve -	5·59	6·95	7·49	6·01	6·51
Stones passing 1 inch, and retained by ½ inch sieve - -	9·48	7·33	7·43	6·18	7·60
Stones passing ½ inch, and retained by ¼ inch sieve - -	6·04	4·44	3·58	3·36	4·35
Total stones -	21·11	18·72	18·50	15·55	18·46
Mould passing ¼ inch sieve -	77·77	80·36	79·80	83·29	80·31
Roots, loss by evaporation, &c. -	1·12	0·92	1·70	1·16	1·23
Total fresh mould -	78·89	81·28	81·50	84·45	81·54
	100·00	100·00	100·00	100·00	100·00
TEN-ACRE FIELD.					
Stones retained by 1 inch sieve -	1·54	2·47	3·66	2·90	2·64
Stones passing 1 inch, and retained by ½ inch sieve - -	1·92	2·18	2·43	3·68	2·55
Stones passing ½ inch, and retained by ¼ inch sieve - -	3·04	1·72	1·98	3·43	2·54
Total stones -	6·50	6·37	8·07	10·01	7·73
Mould passing ¼ inch sieve -	92·65	91·25	90·36	89·13	90·85
Roots, loss by evaporation, &c. -	0·85	2·38	1·57	0·86	1·42
Total fresh mould -	93·50	93·63	91·93	89·99	92·27
	100·00	100·00	100·00	100·00	100·00

The mode of collecting the samples was as follows:—A strong iron frame, in the form of the four sides of a box without either top or bottom, 12 inches square by 9 inches deep, was driven into the ground as much more than 9 inches as to allow a very thin sod (only just thick enough to insure the removal of the whole of the green matter) to be taken off the top of it. The contents of the frame were then carefully dug out; and four such samples of 12 inches square by 9 inches deep were taken from each plot, and mixed together. The soil of each plot was thus represented by a sample, averaging, in the case of the Five-acre Field rather over, and in that of the Ten-acre Field somewhat under, 300 lbs.

TABLE XLIV.

Results of the Chemical Analysis of the Rugby Soils.

Per-centages of Water, Organic Matter, Nitrogen, and Nitrogen reckoned as Ammonia.

Plots.	Water per Cent.		Organic Matter per Cent.			Nitrogen* per Cent.							Nitrogen reckoned as Ammonia Mean, per Cent.		
	In Fresh Mould as analysed.	In Total Fresh Soil (including Stones, &c.)	In Fresh Mould.	In Dry Mould.	In Total Fresh Soil (including Stones, &c.)	In Fresh Mould.					In Dry Mould.	In Total Fresh Soil (including Stones, &c.)	In Fresh Mould.	In Dry Mould.	In Total Fresh Soil (including Stones, &c.)
						Expt. 1.	Expt. 2.	Expt. 3.	Expt. 4.	Mean.	Mean.	Mean.			
FIVE-ACRE FIELD.															
1	14·65	11·39	5·30	6·21	4·12	0·192	0·191	0·191	0·191	0·191	0·224	0·148	0·232	0·272	0·180
2	15·59	12·53	5·80	6·87	4·66	0·195	0·191	0·197	0·204	0·197	0·233	0·158	0·239	0·283	0·192
3	15·22	12·15	6·06	7·15	4·84	0·187	0·183	0·190	0·182	0·185	0·218	0·148	0·225	0·265	0·180
4	14·68	12·23	5·05	5·92	4·21	0·182	0·181	0·186	0·184	0·183	0·214	0·152	0·222	0·260	0·185
Mean -	15·04	12·08	5·55	6·54	4·46	0·189	0·187	0·191	0·190	0·189	0·222	0·152	0·230	0·270	0·184
TEN-ACRE FIELD.															
1	20·66	19·14	9·10	11·47	8·43	0·264	0·258	0·257	0·252	0·258	0·325	0·239	0·313	0·395	0·290
2	18·61	16·98	9·80	12·04	8·94	0·243	0·247	0·236	0·246	0·243	0·299	0·222	0·295	0·363	0·270
3	17·60	15·90	8·20	9·95	7·41	0·240	0·236	0·226	0·231	0·233	0·283	0·211	0·283	0·344	0·256
4	17·56	15·65	9·20	11·16	8·20	0·254	0·247	0·252	0·249	0·251	0·304	0·224	0·305	0·369	0·272
Mean -	18·61	16·92	9·08	11·16	8·25	0·250	0·247	0·243	0·245	0·246	0·303	0·224	0·299	0·368	0·272

* The Nitrogen was determined by combustion with soda lime, and estimation as ammonia in the usual volumetric way. The results do not, therefore, represent the total nitrogen inclusive of that in the form of nitric acid, if any, excepting so far as it might be reduced by the organic matter present. Further, as the note at the foot of Table XLIII. will show, the figures only relate to the composition of the layer of 9 inches in thickness taken immediately below a very thin sod.

APPENDIX No. 2.

Notes on the Edinburgh Sewage Meadows.

The following statements relating to the sewage-irrigated meadows in the neighbourhood of Edinburgh are based partly upon information obtained on the spot from Mr. Mc Pherson the city surveyor, and from the occupiers or managers of the meadows in the respective localities, and partly upon correspondence with the latter gentlemen. Mr. Mc Pherson kindly provided information as to the population, water supply, springs, and area of rainfall and drainage, contributing to each set of meadows as named or classed together in Table I. below ; and from the occupiers or managers, information as to the area under irrigation, and other points, was obtained. As, however, the sewage is in no case passed over the land the whole 365 days and nights of the year, it must be borne in mind that the statements given as to the amount of population contributing to, and the number of tons available for, each acre, do not show the amounts actually utilized in each case, but only approximately the total amounts available, whether used or wasted. The fact that water-closets are not universal must also be taken into account.

Table I.

Names of Meadows.	Imperial Acres under Irrigation.	Approximate Population contributing to each Acre.	Approximate Quantity of Sewage available for each Acre.
			Tons.
Lochend, Spring Gardens, and Craigentinny	285	337	20,500
Roseburn and Western Dalry - -	80	112	17,000
Quarry Holes - - - -	8	562	65,000
Broughton Burn - - - -	6	1,666	102,000
The Grange - - - - -	16½	302	97,000

1. *Lochend and Spring Gardens.*

The Lochend and Spring Gardens meadows, occupied by Mr. Scott, and under the management of Mr. Peter Taylor, comprise about 35 imperial acres, and are irrigated by the sewage of a large portion of Edinburgh on its way to the more extensive Craigentinny meadows. Mr. Taylor estimates that, on the average, each acre gets the flow of a stream of 12 by 8 inches, at a rate of 2 miles per hour, for 10 days of 16 hours, annually, which is equal to about 31,000 tons per acre per annum. The sewage is applied from about the beginning of March to the end of November. The herbage consists chiefly of rough meadow-grass (*Poa trivialis*), which is the most prevalent where the ground is dry, and couch (*Triticum repens*), which is the second in predominance, and grows freely, but is not so early as the rough meadow-grass. There is also a great deal of crow-foot, more particularly where the drainage is imperfect.

On a portion of higher lying land, which is irrigated by the aid of a water-wheel, worked by the sewage stream itself, and where the supply is necessarily more limited, Italian rye-grass is grown, which involves the periodical breaking up of the land. After two years under the rye-grass a crop of potatoes is taken, then Italian rye-grass is sown again, and so on. Mr. Taylor stated that if this land could be irrigated by an

abundance of sewage by gravitation he should prefer to lay it down as permanent meadow.

2. *Craigentinny.*

The meadows at Craigentinny, which are the property of Mr. Christie-Miller, are under the management of Mr. Bryce. About 190 acres of permanent meadow are irrigated by gravitation. A portion of this area consists of a good loamy soil, but a part of it was only barren sand before it was laid down for sewage irrigation. During the summer the sewage is applied day and night, and all that is available is then used, excepting during floods. The sewage is also applied through a considerable portion of the winter, but then during the day only. Perhaps it is unused 70 to 80 days in the year. The general plan during the summer is to let the whole of the water go over from 2 to 2½ acres at a time, changing every 3 or 4 hours during the day, but less frequently during the night ; and the application is so timed as to get over, on the average, about 60 acres per week, and to give each acre such a dressing about once in three weeks. The applications are, however, less frequent during the winter. The distribution over about 100 acres can be attended to by one man ; but the cleaning of the runs, keeping the roads, &c., require additional labour. Four to five crops are obtained annually ; though four, cut at the proper times, generally yield better, and leave the herbage in better condition than when five are taken. From good, well managed meadows, with sewage as liberally applied as on the gravitation meadows at Craigentinny, Mr. Bryce thinks about 60 tons of green grass should be obtained per imperial acre annually. The price varies, according to season and other circumstances, from 6*d.* to 14*d.* per cwt., on the ground, standing. The produce consists almost entirely of rough meadow-grass, which is considered the most valuable, couch, which is looked upon as a very good grass and of very rapid growth, and common rye-grass, which is also considered a good grass, but not to give so close a bottom as the others.

Arrangements are also made for irrigating some higher lying land, by raising the sewage about 20 feet, it being first brought into a large tank by means of a deep underground drain from the highest level of the natural flow, and thence pumped into open channels for surface distribution. Only about 60 imperial acres are now so irrigated, but formerly a larger area was under the treatment. The application is continued from April to October inclusive ; and each plot gets six dressings, and yields three cuttings, annually. If it were not for the cost of lifting, more of this land would be laid down as permanent meadow, and much more sewage would be put upon it ; but the supply being so limited by the cost of application, Mr. Bryce thinks it better to sow Italian rye-grass, break up every two years and grow potatoes, re-sow rye-grass, and so on.

3. *Roseburn and Western Dalry.*

These meadows, situated to the west of the city, stand second in point of extent and importance to those of Craigentinny. They formerly comprised 100 imperial acres or more, but are now limited to about 80, having been considerably curtailed by the encroachments of railways, and for other purposes; and as much as 1,000*l.* per acre has frequently been paid as compensation. They were laid down for irrigation by Mr. James Thomson, who commenced his operations in 1826, and they still continue under his excellent management. Part of the soil is gravelly, and part loamy, with a subsoil of clay. The sewage

coming to these meadows includes the refuse from extensive slaughter-houses, and also that from a very large distillery. It is used all the year round, both day and night, and on Sundays when it can conveniently be left to flow from Saturday night to Monday morning. In summer the water seldom goes over the same piece of land more than a few hours together—as long as may be necessary thoroughly to soak it. The land is generally watered only twice, but occasionally three times, between the cuttings. In winter the water is allowed to flow for a longer period over a given area, in order to "feed" the land as much as possible. In laying down permanent meadow for irrigation, Mr. Thomson has sometimes sown a great variety of grasses, but finding that even when he has sown 15 or 20 different kinds, most of them have in the course of a few years gradually died out, leaving only those suitable to the soil and the sewage, he sometimes selects only three or four, and in one instance transplanted couch from arable land, and reports that the piece so treated is now as good as any.

4. *The Grange.*

Next in extent to the Roseburn and Dalry sewage meadows come those of the Grange, situated to the south of the city, and farmed by Mr. Mc Gill. The area of these meadows is at present only 16½ imperial acres; but it is less now than formerly, having been contracted for want, as was stated, of a sufficient supply of sewage. Indeed, the opinion given by Mr. Mc Gill, junior, was, that the greater the amount of water applied the better. The Table (p. 198) shows that the population within the area contributing to these meadows, and the amount of fluid available per acre, are, however, very large. On the other hand, the district is but imperfectly provided with water-closets, and the sewage is probably very dilute. The flow is frequently shifted only once a day, though sometimes three or four times, and in the spring, before the first cutting, generally as much as twice. The water is, as a rule, applied the day the grass is removed. The application is continued through the greater part of the winter, excepting where the last crop has been fed off. Perhaps the sewage is unused about six weeks in the year. The land is heavy, and rather steeply inclined. To a few plots on one side of the valley sewage is applied by gravitation, through a pipe carried across from a higher level of the natural flow on the opposite side.

The herbage contains no clover; and is, in fact, very soon brought down to a very simple character. It contains much couch, and also in some parts a good deal of crow-foot. When the plots are well managed four or five cuttings are obtained during the season. The crops of 1862 were sold at sums varying from 13*l.* to 38*l.* 5*s.* per imperial acre; the difference depending much upon the amount of sewage, the character of the land, the aspect, and the previous management of the cuttings, all of which affect the amount and character of the produce; but the convenience of position for cartage, proximity to other plots held by the purchaser, and other incidental circumstances, also sometimes affect the rates given for individual plots considerably.

Mr. McGill was of opinion that very much depended upon the quantity and strength of the sewage applied, and stated that portions of the land which had been irrigated by comparatively strong sewage were much more productive than others irrigated by almost pure water.

5. *Rose Bank, Broughton Road.*

These meadows, under the management of Mr. William Reid, comprise a little more than six imperial acres, and have been under irrigation

about 30 years. They are watered about 11 months in the year, at a cost of two shillings per week, given to a labourer who does the work of application at his meal-times and in over-time. The runs are, however, cleaned out in the winter by extra labour, paid for by the sale of the refuse, which commands about 2*s.* 6*d.* per ton. As the Table shows, the quantity of sewage available is enormous, being about 100,000 tons per acre per annum. Mr. Reid considered that quantity of water was a very important point, but that his supply was sufficient for considerably more land. He had not any more, however, at a convenient level, and did not consider that it would pay to be at any expense in raising the sewage. The irrigation is continued throughout the greater part of the winter as well as in the summer, and on Sundays as well as on other days. The water is applied to the same plot for three or four consecutive days, and the land gets, on the average, two such dressings for each cutting. It is considered better not to apply the sewage immediately after cutting, but to wait a few days until the grass has begun to shoot. The water does not run off the land clear. Four or five cuttings are obtained annually. The plots are from one-quarter to half an acre each, and they let at rates which amount to from 25*l.* to 30*l.* per imperial acre.

Mr. Reid's supply of sewage being so abundant, and having garden ground lying conveniently for its application, he occasionally applies it to about two acres; but he stated that he would go to very little expense in arrangements for the application of such small quantities as could be so used. The garden crops for which the sewage was found to be the most useful are turnips, cabbages, and onions.

6. *Quarry Holes.*

The Quarry Holes meadows, farmed by Mr. Thomas Skirving, comprise only about eight imperial acres, and the amount of sewage available per acre is very large, being about 65,000 tons per annum. The whole is in permanent meadow. The sewage is applied day and night, and on Sundays, the whole year round, excepting during very hard frost. A plot of an acre, more or less, receives the supply for about two days at a time, and gets three such dressings between the cuttings; but the water is not put on until two or three days after cutting, nor is it considered desirable to apply it when the grass is far advanced. As the Table shows, the amount of population contributing to each acre is greater in the case of these meadows than in that of any other in the neighbourhood of Edinburgh, excepting those of Rose Bank, and the amount of water is also very large. There is no doubt that there is very extravagant expenditure of manurial constituents here, as there is indeed in all the other cases; but it must, at the same time, be admitted that it is under these conditions that a greater amount of produce is obtained per acre under the influence of sewage than anywhere else, and perhaps among all the Edinburgh sewage meadows those of the Quarry Holes stand second to none in point of evenness of herbage, and amount and value of produce per acre. The prevailing grasses are rough meadow-grass and common couch.

APPENDIX No. 3.

NOTES ON THE SEWAGE-IRRIGATED MEADOWS AT BEDDINGTON NEAR CROYDON.

The following particulars were obtained on the spot, partly from Mr. Latham the engineer to the Croydon Local Board of Health, and partly from Mr. Marriage, junior, son of the gentleman who rents and farms the irrigated meadows.

The population of Croydon contributing to the sewage tanks is about 16,000; and the water contributed to them is estimated at about 40 gallons per head per day without rainfall, and to average, the year round, perhaps 60 gallons per head per day with rainfall. These amounts are equal to about 65 tons per head per annum without, and 98 tons with rainfall. About 300 acres are rented by the Board at 4*l.* per acre without sewage, and sub-let to Mr. Marriage at 5*l.* per acre with sewage. Up to Midsummer 1864, 260 acres had been prepared for irrigation, of which about 250 might be considered as actually under irrigation during the year. It was intended to have 90 to 100 acres constantly under Italian rye-grass, but as yet not so large an area was under that crop.

The plan of irrigation is to let the sewage flow over from 20 to 30 acres for about four days and nights, and to give three such dressings between each cutting. As much of the water as can be recovered for the purpose is re-distributed, and in this way a large proportion is always used at least twice, sometimes three, and even four times over, and on the average about two and a half times, by which its utilisation and purification are rendered much more complete than otherwise would be the case. According to the figures given above there are about 6,250 tons of the dilute sewage with rainfall annually available for each of the 250 acres; but as so much of the water is re-used the average amount passing over each acre is very much more. There are also annually available for each acre the excretal matters of about 64 individuals of the mixed population of both sexes and all ages.

The land under sewaged Italian rye-grass is estimated to yield at least four cuttings, and from 30 to 35 tons of green produce per acre per annum. The cuttings commence in April, and last to the end of October, and even into November. This grass sells for about 25*s.* per ton in London, and is estimated to realise from 16 to 17 shillings per ton on the land. The sewaged meadow-grass also yields at least four cuttings annually, but it is much less liked than the Italian rye-grass by the London feeders, and is generally sold on the land by the rod, or grazed, and is estimated to yield several pounds less gross money return per acre per annum than the rye-grass.

Mr. Marriage does not apply the sewage in any systematic way to any other crops than permanent meadow and Italian rye-grass, but was about to try it on a small scale to mangolds.

There was a proposition under consideration by the Board to enlarge the area by 100 to 150 acres, which, notwithstanding the rapid increase of the population and of the sewage of the district, will, if carried out, considerably reduce the number of population contributing, and the amount of sewage available, to each acre annually.

About 180 tons of moist solid matter are annually deposited, or intercepted by the strainers, at the tanks, and are sold by the Board at a very low price per ton.

Before the above arrangements for passing the sewage of Croydon over the land were made, the Board were constantly subjected to legal

proceedings on account of the pollution of the river Wandle by the discharge of the sewage into it; but now those having the right of the fishing in the river have found it worth while to put down gratings to prevent the fish ascending the drainage outfall from the sewage-irrigated land.

In the following Table are collected together the results of some partial analyses of Croydon sewage, drainage, &c., which have been kindly communicated by Mr. Latham. The first four analyses are given on the authority of Messrs. Way, Evans, and R. D. Thomson, and the remainder on that of Messrs. Way and Evans alone.

TABLE I.—Results of the Analysis of the Water of the River Wandle, and of the Sewage of Croydon before and after Irrigation.

—	Grains per Gallon.			
	Inorganic Matter.	Organic Matter.	Total Solid Matter.	Ammonia.
Samples collected October 1861.				
River Wandle above sewage outfall	18·56	1·44	20·00	0·18
Do. do. below sewage outfall	20·16	2·08	22·24	0·18
Sewage from an independent sewer	48·30	52·20	100·50	6·70
Drainage after sewage irrigation	23·40	2·40	25·80	0·21
Samples collected November 16, 1861.				
Sewage before reaching the tank, 11 a.m.	26·30	12·80	39·10	..
Drainage after sewage irrigation, 12.30 p.m.	21·25	6·50	27·75	..
Do. do. do. do. 2.30 p.m.	26·30	2·40	28·70	..
Do. do. do. do. 4.30 p.m.	25·50	3·45	28·95	..
Samples collected November 18, 1861 (after a sharp frost).				
Drainage after sewage irrigation, 2 p.m.	20·65	2·65	23·30	..
Do. do. do. do. 4 p.m.	20·95	2·90	23·85	..

The above analyses do not show what proportion of the several constituents existed in suspension and solution respectively; and, of the two samples of sewage, that collected November 16 contained, even before reaching the land, comparatively little solid matter of any kind. So far, however, as can be judged from these few, and little more than initiative results, it would appear that the water was to a considerably greater degree purified by its passage over and through the land than was the case in the Rugby experiments, in which the arrangements did not admit of the fluid being used two or three times over as with the more extended area at Croydon. The subject of the composition of the drainage-water passing from land liberally sewaged, but under arrangements for the re-distribution of the water until it is as far as practicable both utilised and purified, is, however, one of great importance, still requiring careful investigation.

APPENDIX No. 4.

Sewage of Towns.

The best mode of dealing with the sewage of towns has excited much interest.

The question as to the best mode for the disposal of town sewage has been met, in some recent instances, with a demand to abolish main outlet sewers and return to "a judicious use of cesspools."

Those who advocate a return to cesspools cannot have made themselves thoroughly acquainted with the evils involved by a retention of refuse near and within dwelling houses until putrid fermentation sets in and the most deadly forms of disease prevail. Modern sewerage and drainage works have, by the discharge of sewage, unquestionably fouled rivers, and there is a strong desire expressed on behalf of proprietors and populations resident on the banks of rivers, to prevent such fouling by forbidding any discharge of town or house sewage into rivers.

In the metropolis works of extraordinary magnitude in "High Level," "Mid Level," "Low Level intercepting," and "River Embankment Sewers," are now in course of construction, the estimated cost of which works exceeds 4 millions sterling. The whole volume of sewage, on both sides of the Thames, being discharged into the river at the points of outlet. These works, gigantic and costly as they are, only imperfectly intercept sewage from the river within the boundaries of the metropolis to discharge the concentrated volume into the tidal area a few miles near the estuary.

Proposals to utilize the sewage and to remove it from the Thames outlets are before the Metropolitan Board.

Town sewering and the disposal of town sewage involve sanitary questions of vital importance to the entire community—questions which have not been fully discussed, because they do not seem to have been fairly comprehended as forming the basis of sanitary science.

Irrigation of land by water is probably as old as civilization. The waters of the Nile irrigated the lands of Egypt from time immemorial, and irrigate them to this day. There are vast ruins in Ceylon and in central India of "bunds," reservoirs, tanks, and conduits which were used for the irrigation of adjoining lands. In China, rivers, lakes, and canals are made to aid artificial irrigation, and were so used when Great Britain was inhabited by painted savages; and there are remnants of canals and water conduits in Mexico and Peru, formed by a race of men who are chiefly known by vast ruins of temples buried in almost impenetrable forests.

Throughout the whole of the East water has been economized and used for purposes of agriculture from times beyond the records of written history.

There are modern works of irrigation on a great scale in British India and in parts of Spain, as also in Northern Italy. Italian irrigation is fully described in a "Report on the Agricultural Canals of Piedmont and Lombardy." Two volumes (1852).

The information contained in these volumes is so much to the point, in some respects, as showing how vast volumes of water are regularly and continuously disposed of for purposes of land irrigation, that I have made a short abstract. The entire volume of London sewage is only a small fraction compared to the bulk of water used in Piedmont and Lombardy.

(In the Preliminary Sewage Commission Report, Appendix No. 1., an account is given of a visit of inspection made by members of the Commission to Milan.)

In Piedmont some one and a half millions of acres are under irrigation ; the volume of water at command is stated to be 8,290 cubic feet per second, conveyed through 1,200 lineal miles of canals, and distributed by numerous minor carriers and irrigating channels. The volume of water passed on to the irrigated lands varies from 5,000 up to 12,000 tons per acre per annum.

In Lombardy vast areas of land are under irrigation. In round numbers some 9,350 square miles, or about six millions of acres. The volume of lake, river, and spring water at command is estimated at 30,730 cubic feet per second, or about 100 times the estimated volume of sewage to flow from the entire metropolitan area. Within the watershed of the Thames there are about three and a half million acres, and the dry weather flow of the Thames may be stated as about 1,000 cubic feet per second, so that it appears a volume of water equal to thirty times the dry weather flow of the Thames is used for purposes of irrigation in Lombardy.

The irrigated soil of Piedmont and Lombardy consists, for the most part, of deep beds of gravel overlaid by light sands through which water finds its way with facility. In the plains there are marsh and heavy lands requiring to be drained ; vast areas are grazed by horses, cattle, pigs, and other stock, the manure made serving to enrich the soil.

The climate of Piedmont and Lombardy is favourable to a large use of water. In May, June, July, and August the mean temperature throughout the irrigated region ranges from 70° to 75° Fahr., and the maximum from 85° to 90°. At Milan, the temperature is, at times, 94°, at Brescia 93°, at Lodi 91°, and at Mantua 98° ; the hygrometer showing an extraordinary degree of dryness in the atmosphere during the season of irrigation. With such subsoil, gravel and sand, such temperatures, 70° to 98° Fahr., and with such dryness of atmosphere, water for the land is of the utmost importance. During winter the entire district is, however, in a state of extreme humidity, approaching closely to saturation.

The fall of rain in the irrigated region is about 38 inches annually. The fall of rain is, however, confined to few days as compared with England. In Piedmont there are about 24 rainy days, and in Lombardy about 71 rainy days during the year. On an average, in northern Italy, there are about 200 clear days of sunshine, 125 cloudy days, and only 40 days on which rain falls. For little less than half the year the sky at Milan is unclouded, at Lodi more than half the year, and at Brescia for two thirds of the entire year the sun's light and heat are unchecked by cloud, so that we can comprehend how subsoil and climate allow 30 millions of tons of water per day to be passed over irrigated portions of lands with advantage. The pecuniary results obtained vary from £5 per acre, in the country, up to £10, and even £20 per acre per annum in the suburbs of Milan and other towns.*

Nature has done much for northern Italy in having provided mountain, rivulet, lake, river, and plain. Lombardy is bounded on the north by mountains (the Alps) capped with coverings of snow ; there is a vast drainage area situate from 1,000 to 3,000 feet, and rising in mountain peaks 15,000 feet above the sea. This area is studded with lakes, of which Lago Maggiore is one of the chief ; this single lake having

* Some of the works of irrigation do not pay interest upon the money expended even with all the natural advantages of subsoil and climate.

a superficial area of water of 47,280 acres, and an outlet elevation of 638 feet above the sea. Springs, rivulets, and streams feed the lakes which act as huge natural storage reservoirs, out of which rivers and rivulets flow down into and through the vast sunny plains below. Artificial waterworks in Great Britain sink into insignificance when compared with the arrangements provided by nature above the plains of Lombardy; even the huge "bunds" and reservoirs, tanks and conduits of Ceylon and of India are small in magnitude compared with the lakes of northern Italy. Nature lifts the water in vapour and in cloud, to store it so as to be available for human uses. For irrigation in Piedmont and Lombardy there is no artificial steam and engine power requisite. The fuel is in the sun, the lifting apparatus is in the clouds, vast natural lakes are store reservoirs, whilst rivers and smaller streams are conduits or "carriers."

The modern sewering of towns and draining of houses in England has led to the fouling of streams and rivers; but, and this must be fully considered, the value of human life has been increased in proportion as cesspools and cesspits have been abolished, and refuse has been removed in water.

The beneficial effects of sewers, drains, and waterclosets, in improving health, are recorded regularly in the Registrar General's returns. Notable instances have been mentioned as having taken place at Salisbury, at Worthing, and at other places. Dr. Letheby regularly records a rate of mortality for the city of London which no other capital in the world can parallel. The mortality of the metropolis is lower than that of Liverpool, Manchester, Birmingham, Leeds, Sheffield, or any other great town in the United Kingdom. In London, privies, cesspools, and cesspits have been systematically abolished, tubular drains and waterclosets have been substituted.* In the other large towns named the local civic authorities have not, as yet, learned so much of sanitary science. They believe in cesspits, or they dread sewerage rates; there are, however, worse forms of taxation than sewerage rates. The Registrar General in his report on the mortality of cholera in England, 1848–49, wrote, "Cholera ravaged the population through summer, after harvest destroyed more than a thousand lives a day for several days in succession, and in the year had slain 53,293 men, women, and children. Pestilence found in so many cities, towns, and districts, poisonous putrid matters ready to destroy this number of inhabitants."

Plague, cholera, and typhus appear to have one common propagating nidus—fermenting filth, foul air, and squalor. There must be soil, seed, rain, and sunshine to produce herbage and grain; there must be the elements necessary to grow zymotic diseases before they can prevail.

The common privy and cesspit are great nuisances, especially in towns. The cesspit is most frequently placed in small yards behind houses, at times beneath living rooms and bed-rooms, crowded in amongst thickly built cottages, so as to foul the subsoil below and the air above; very frequently the festering wet soil filters through cottage walls or floods the cottage floor, causing discomfort, disease, and death. Parish surgeons and medical men who visit the poor have borne witness, on numerous occasions, to the evils of town cesspits. Local

* Old sewers in the Metropolis have not been constructed on any well defined principles. There are about 1,300 miles of main sewers, besides 82 miles of outlet sewers, and upwards of 300,000 houses drained. Many of these old sewers are in ruins, have flat inverts, and retain foul deposit. The main sewers are also defectively ventilated.

registrars record the heaviest death-rates in such districts, and the relieving officer spends most of the parish money among the wretched inhabitants.

In many large towns cesspits, though private nuisances, are public property; the municipal governments claim the right to empty them. The word "cleanse" is used in the municipal records; cesspits are emptied, but they are never cleansed. In this process of emptying there is a vast amount of human suffering. Not unfrequently the foul refuse must be carried, or wheeled, through houses, on all occasions it must be removed into streets, and those only who have experienced the sickening smell can fully understand the misery endured by the unfortunate inhabitants given up to the operations of nightmen. This operation is not only foul and mischievous, but unremunerative to the extent of 50 per cent. of the entire outlay. That is, if it costs £20,000 per annum to empty the middens and cesspits in Manchester, the sale of manure and ashes will not produce more than half this amount. The pecuniary loss to the inhabitants in damaged health cannot so readily be estimated.

As compared with privy and cesspit the watercloset is a vast improvement, and if drain, sewer, and water supply are complete, no fouling of urban atmosphere or of subsoil can take place. From a well-drained house, and completely sewered town, all refuse is removed at a rate of at least one mile per hour. "Dry closets," of every form, are necessarily social abominations in a town.

Some few attempts have been made to apply liquid sewage direct to land for agricultural uses, but no actual and unmistakable results have, as yet, been realized on any great scale. Edinburgh and Croydon are both exceptional in some respects. Large volumes of sewage, at both these places, flow directly on to and over land peculiarly fitted by nature to produce results, in many respects, favourable. In neither case is there (to any serious extent) steam-engine power required for pumping, nor is there any expensive distributing plant, or distributing piping. The sewage is flooded on to the land without cost, without stint, without fettering conditions, and it produces heavy crops of grass, and below Edinburgh some of the land has been continuously irrigated for more than 200 years without diminution of the annual crop. Land is the proper place for liquid sewage, and in every instance where liquid sewage, in its discharge from sewers, is liable to become a nuisance the local authorities ought to be compelled to filter their sewage through land, even if at a pecuniary loss in the process. Towns can afford to pay the necessary costs of works capable of preventing both nuisance and disease. Liverpool and Manchester each pay some eight or ten thousands of pounds annually to remove foul cesspit matter, which has worked incalculable mischief. It cannot, therefore, be considered any extravagance if the capital represented by such sum should be expended in utterly abolishing cesspits, by a regular and continuous removal of cesspit matter in a fluid state on to and over land, so as not to be cause of nuisance.

That town sewage has value as a manure has been proved by every chemist of name. Liebig, Lawes, Way, Gilbert, Hoffman, and others give it a money value of from 2*d.* to ½*d.* per ton of fluid. Professor Way, however, affords a key to one form of difficulty, namely, the cost of application may be, in some cases, more than the value of the manure.

Up to this time sewage has been dealt with by several processes. At Birmingham there is merely skimming and separating of solids by

precipitation in tanks; the sewage water, slightly clarified, flowing into the river Tame from the tanks. The dry weather volume of sewage at Birmingham is about 12 million gallons per day, the amount of sediment removed from the subsiding tanks is about 25,000 tons per annum. This sediment is, for the most part, road grit, worn and washed from road and street, mixed with true sewage matter. The tanks are regularly emptied, but the material is, or was, unsaleable even at so low a price as sixpence per ton. The refuse comes out in the form of sludge and cannot be readily dried so as to be made portable. The cost to the corporation is some thousands per annum. The river is still tainted, and the adjoining land is injured rather than benefited.

Liquid sewage is spread over land at Croydon by gravitation; at Carlisle, Rugby, Watford, and at Worthing by pumping. In some other places the sewage solids are intercepted, as at Leamington, Cheltenham, Leicester, Tottenham, Worksop, and Morpeth; but in the greatest number of places the entire sewage is wasted into the nearest river or watercourse, as at Berwick-upon-Tweed, Alnwick, Lancaster, Liverpool, Manchester, and at most of the Lancashire towns, as also at all the towns throughout Cumberland, Northumberland, Durham, and Yorkshire. Indeed one sweeping remark may include 99 hundreds of all the cities, towns, villages, and districts in Great Britain,—with slight exceptions, there is a general waste of sewage, where sewers exist.

The question of sewage utilization has been thrown back by errors in works; too much has been expected and too much has been attempted. Experience, so far as carried, proves that fluid sewage cannot be manipulated into a solid manure so as to pay. There have been attempts at Leicester, at Tottenham, and for a time at Croydon. During the continuance and working of these sewage works there was the greatest possible amount of nuisance with no paying result. At Leicester the solid which was expected to sell for four pounds per ton could not be sold for four shillings a ton. At Birmingham the sewage sludge accumulates beyond the power to sell it at sixpence a ton. At Leamington there is an annual cost, at the outlet works, of some 400*l.* to precipitate and remove the sludge from about one million gallons of sewage per day. At Cheltenham, Coventry, Worksop, and at some other places the deposited sludge is sold at prices ranging from one shilling to two shillings per ton; in all these cases the fluid—the true sewage—is wasted.

To utilize fluid sewage land is required, and a regular agricultural establishment must be set up. Town Councils and Local Boards of Health have not, as yet, considered it a part of their duty to obtain land by lease or by purchase—with the exception of Croydon—and here an "Injunction" was necessary to compel local action.

The Croydon case settles the question, so far as it goes, namely, that irrigation by gravity, through surface carriers and open grips, over loamy ground, and producing grasses, will purify sewage water without causing nuisance, and will also produce a moderate income. But, if the Croydon sewage had required to be lifted 350 feet vertical (the lift contemplated for vast volumes of metropolitan sewage), and if cast iron and earthenware conduit pipes (as proposed for distributing metropolitan sewage) had been laid down the balance would have been against the Local Board of Croydon.

The only safe mode of advancing the project of sewage application will be to commence works in the simplest and cheapest forms; namely, surface irrigation by gravity. This can be done on both sides of the Thames to a limited extent; the experiment, if found to pay, can then

from time to time, be extended. To lease the sewage of London to a company, proposing to raise and expend capital by many millions sterling, will be ruin to confiding shareholders and a cruel punishment to many innocent persons. The Leicester Sewage Company was supported by men of reputation, who risked their money and lost it; but many innocent persons were lured in by seeing well known names on the list of shareholders; so it has been and so it will be again if the Metropolitan Board of Works is driven, by outside opinion, to act contrary to common sense and experience.

The great irrigation works in Piedmont and Lombardy may be studied with advantage; lakes and rivers are turned to account on a grand scale, vast volumes of water are conducted along open canals, and such waters are distributed by open conduits and carriers; the entire volume of water is disposed of by means of surface irrigation. The works are cheap, as compared with the cost of cast-iron mains, and hose and jet, for distribution. It may be said "Italian irri-"gation is by pure water, and London sewage could not be safely "exposed in open channels." The reply is, that open canals will in every respect be cheaper; and, practically, may be prevented from being a nuisance. Covered conduits may be adopted near towns and near houses; but, as by far the greatest length of canal and carrier must be in the country, covering such canals and carriers, in such positions, would be an extravagant waste of capital. Brick tanks, in which to store sewage, soon become vast abominations; canal-like tanks, with earth sides, should, in all cases, be used, as the earth acts as a disinfectant; and in such canals greater length and area can be obtained for the outlay.

If the rivers of England are to be purified, it must be by intercepting canals to receive all fluid refuse and convey it to land for purposes of irrigation. The river Thames requires intercepting canals through its entire length. Such work need not be planned beyond the rateable means of the populations resident on its banks, and who now contribute to the pollution of its waters. This form of improvement may also be carried out on every polluted river in the kingdom with advantage. Any income derived from irrigation will be in reduction of first cost, establishment, and working charges.

The inquiries and experiments made up to this time tend to the following conclusions; namely,

That the pollution of rivers and streams ought to be prevented.

That sewage is beneficial to agriculture, when applied to land.

That the available value of sewage will depend upon local contingencies, which can only be estimated when all the elements are known. The chemists' test and value form only one item in the problem.

When sewage is applied to land, as at Edinburgh and at Croydon, it does not appear to injuriously affect health in the locality.

Sewage irrigation works should be as simple and as economical as is possible. Gravitation and surface irrigation, as at Edinburgh and at Croydon, should be made available wherever practicable. If steam pumping power is necessary, open canal-like tanks, open carriers, and surface irrigation should be adopted. No lift should be attempted greater than is necessary to allow the sewage to flow by simple gravity.

Sewage irrigation may be carried on over the same ground for an indefinite period, as is proved by some of the land near Edinburgh, which has been regularly irrigated upwards of two centuries.

No known or tried form of precipitating sewage, so as to obtain a portable solid manure, has ever been made to pay in Great Britain.

The utilization, so as to purify town sewage, ought to be imperative, as at Croydon.

Sewage is continuously produced and should be as continuously utilized. This will be accomplished most easily and cheaply by having at command a proper proportion of land to act as a filter. Sand, gravel, or combinations of sand, gravel, and loam form the best natural filters. Heavy clay lands should be avoided, excepting for moderate irrigation.

It will cost more in capital for plant, and in labour to manipulate 500 tons of sewage over ten acres by cast-iron pipes, hydrants, and hose and jet, than to utilize 5,000 tons on one acre by open carriers.

Sewage is not equally rich at all times of the twenty-four hours. In sewers which regularly discharge fresh sewage, as at Carlisle and at all towns sewered on true principles, night sewage and day sewage differ materially. At Carlisle analyses have shown that from 10 o'clock p.m. to 8 o'clock a.m. discharge from the outlet sewer is almost entirely subsoil water. There is, as might be expected, an increase in volume and strength in the morning about 9 o'clock; at noon, and again from 6 to 8 o'clock p.m. In Carlisle, in Wigan, and in Swansea, with 35,000 inhabitants each, and with some 6,000 houses drained, there is no expenditure below the surface in the sewers to remove solids. The daily flow of water is sufficient to preserve the sewers clean.

The sewering of towns on correct principles ought to be promoted, so as to ensure cleanliness, comfort, and health.

Parliamentary authority is needed to give enabling powers to deal with sewage, as generated in the several river drainage areas.

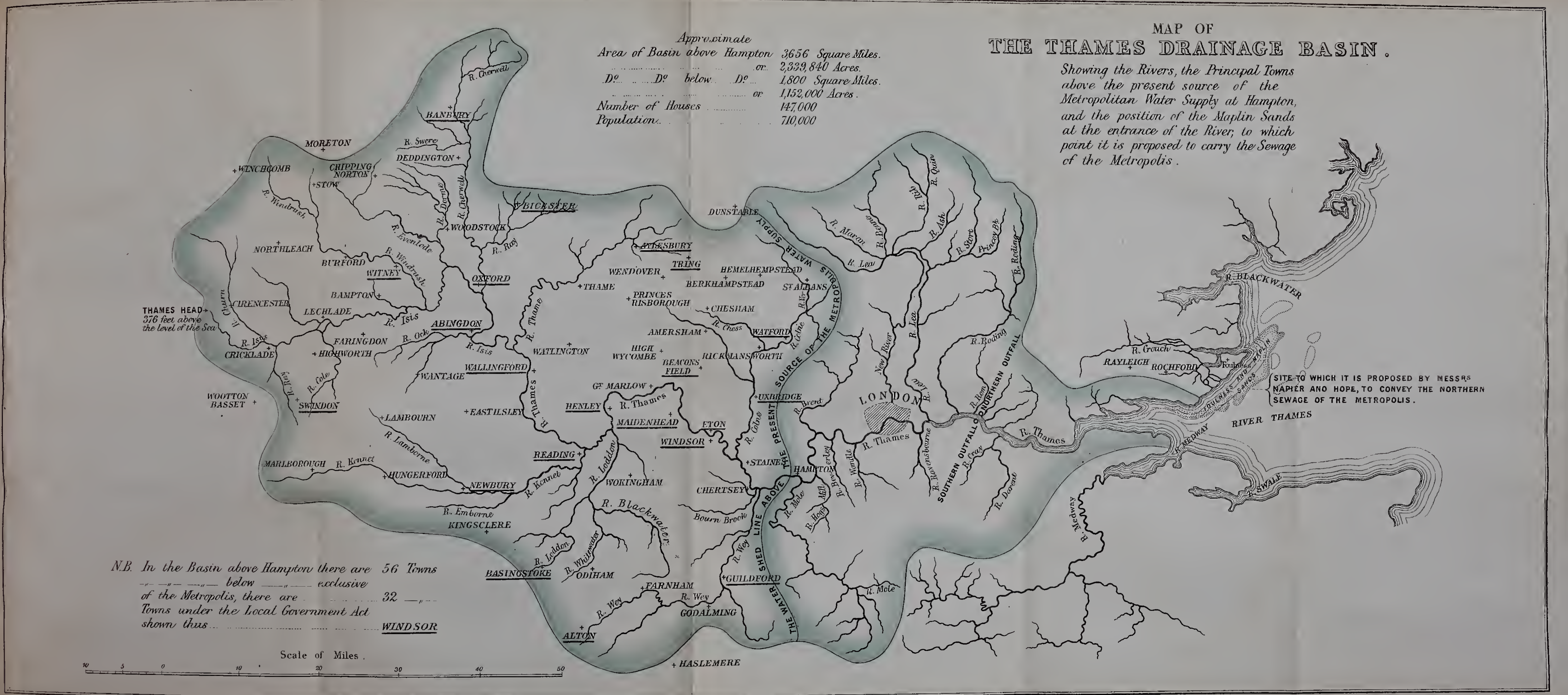
The only safe mode of disposing of town sewage is to filter it through land. The agricultural value will be dependent on local contingencies. Where conditions are favourable and works are cheap and economically managed the application of sewage for agricultural uses will pay. Where conditions are not favourable, a small rate in aid may be required, as at present is the case in many towns, to enable local authorities to dispose of cesspool and cesspit matters.

River areas should be dealt with as a whole, and not, as at present, in detail.

ROBERT RAWLINSON, C.E.

Note.—The map of the river Thames Drainage Basin serves to show how complicated the question of pollution has become. There are 56 towns within the basin of the Thames above the Chelsea and other West-end Metropolitan Waterworks pumping stations at Hampton. These towns consist of not less than 147,000 houses, and comprised a population at the census of 1861 of 710,000. This population is increasing. Many of these towns at present sewer into the Thames, or into its tributary streams, as at Windsor, Henley, Reading, and at Oxford. New and more perfect sewerage works are contemplated for Reading, for Oxford, and for other of the towns in the Thames Basin, so that the waters of the river will become more and more polluted, unless some adequate provision is made to compel filtration of all town and house sewage through, at the least, four feet in depth of agricultural land.

The map also shows the northern and southern outfalls into the Thames, and the site of the Foulness and Maplin sands, which sands are proposed to be reclaimed and irrigated by the Metropolitan sewage from the northern side of the Thames.


MAP OF
THE THAMES DRAINAGE BASIN.
Showing the Rivers, the Principal Towns above the present source of the Metropolitan Water Supply at Hampton, and the position of the Maplin Sands at the entrance of the River, to which point it is proposed to carry the Sewage of the Metropolis.
Approximate
Area of Basin above Hampton 3656 Square Miles.
or 2,339,840 Acres.
Do. Do. below Do. 1,800 Square Miles.
or 1,152,000 Acres.
Number of Houses 147,000
Population 710,000
N.B. In the Basin above Hampton there are 56 Towns
below exclusive of the Metropolis, there are 32
Towns under the Local Government Act shown thus WINDSOR
Scale of Miles.
10 5 0 10 20 30 40 50
SITE TO WHICH IT IS PROPOSED BY MESSRS NAPIER AND HOPE, TO CONVEY THE NORTHERN SEWAGE OF THE METROPOLIS.
THE WATER SHED LINE ABOVE THE PRESENT SOURCE OF THE METROPOLIS WATER SUPPLY
THAMES HEAD
376 feet above the level of the Sea
MORETON
WINCHCOMB
CHIPPING NORTON
STOW
DEDDINGTON
BANBURY
BICESTER
WOODSTOCK
NORTHLEACH
BURFORD
WITNEY
OXFORD
BAMPTON
CIRENCESTER
LECHLADE
FARINGDON
ABINGDON
CRICKLADE
HIGHWORTH
WANTAGE
WALLINGFORD
WATLINGTON
WOOTTON BASSET
SWINDON
LAMBOURN
EASTILSLEY
MARLBOROUGH
HUNGERFORD
NEWBURY
READING
HENLEY
KINGSCLERE
BASINGSTOKE
ODIHAM
FARNHAM
ALTON
GODALMING
GUILDFORD
HASLEMERE
WOKINGHAM
MAIDENHEAD
GT MARLOW
WINDSOR
ETON
STAINES
CHERTSEY
HAMPTON
UXBRIDGE
HIGH WYCOMBE
BEACONS FIELD
RICKMANSWORTH
AMERSHAM
CHESHAM
PRINCES RISBOROUGH
THAME
WENDOVER
AYLESBURY
TRING
BERKHAMPSTEAD
HEMELHEMPSTEAD
ST ALBANS
WATFORD
DUNSTABLE
LONDON
SOUTHERN OUTFALL
NORTHERN OUTFALL
RAYLEIGH
ROCHFORD
Foulness
FOULNESS AND MAPLIN SANDS
RIVER THAMES
R. BLACKWATER
R. MEDWAY
R. Medway
R. SWALE
R. Crouch
R. Thames
R. Isis
R. Cherwell
R. Swere
R. Windrush
R. Evenlode
R. Dorne
R. Ray
R. Churn
R. Coln
R. Cole
R. Ock
R. Thame
R. Kennet
R. Lamborne
R. Emborne
R. Loddon
R. Whitewater
R. Blackwater
R. Wey
R. Mole
R. Hogs Mill
R. Beverley
R. Wandle
R. Ravensbourne
R. Cray
R. Darent
R. Colne
R. Chess
R. Ver
R. Brent
R. Lea
R. Lee
New River
R. Maran
R. Beane
R. Rib
R. Quin
R. Ash
R. Stort
Princey Bk
R. Roding
R. Rom
Bourn Brook

APPENDIX No. 5.

On the Contamination of the Water of Leith by the Sewage of Edinburgh and Leith.

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TABLES.

On the Contamination of the Water of Leith by the Sewage of Edinburgh and Leith. By Stevenson Macadam, Ph. D., F.R.S.E., F.C.S., Lecturer on Chemistry, Surgeons' Hall, Edinburgh.

I. *Introduction.*

The drainage of the city of Edinburgh is at present carried away by three main channels, and the boundaries of these are determined by the uneven nature of the ground on which Edinburgh stands, which necessitates that there shall be three distinct watersheds. The entire population of Edinburgh is about 168,121 persons, who inhabit 34,828 separate occupations, and the rental of the city in 1863–4 was 933,536*l.* sterling. The three drainage districts convey the sewage to separate waters or burns, and whilst a large proportion of the sewage is carried to the Water of Leith, much is taken away to the sea by the Craigentinny Burn and the Powburn or Jordanburn. The larger proportion of the drainage passes into the Water of Leith, and is thence carried down to Bonnington and Leith, receiving accessions of sewage as it passes on, and when it arrives at the harbour of Leith, the water is still further contaminated by the discharges from the sewers of Leith.

The Water of Leith drainage system, within the parliamentary boundary of the city of Edinburgh, comprehends an area of 2,196 acres, on which there are 13,243 separate occupations, and the rental of which in 1863–4 was 456,108*l.*, whilst the population numbers about 69,000. Of the 13,243 dwellings there are 4,460 houses and shops which have no water-closets, but active measures are being taken by the municipal authorities to enforce the introduction of water-closets into those houses which are still devoid of such conveniences; and when these are carried out, the amount of sewage will probably be increased about one fourth. The majority of the houses which drain into the Water of Leith have cesspools in their immediate neighbourhood, and these tend to arrest much of the more solid parts of the sewage, but these cesspools are gradually being abolished, although it will take some time to remove the whole, as about 12,000 out of the 13,243 houses in this district are still connected with cesspools into which all the sewage from the houses passes and thereafter the liquid, with more or less solid matter, flows off into the drain and sewer. When these cesspools, which are a relic of a bygone system, are entirely done away with, the quantity of solid matter conveyed in the sewage of Edinburgh will necessarily increase. The population of Leith is about 35,000, of whom 22,000 reside south of the harbour, in that part of Leith known as South Leith, whilst the remainder occupy houses to the north of the harbour, in the district of North Leith.

During last session parliamentary powers were acquired for the construction of a main drainage pipe which would intercept the sewage of the large district of Edinburgh and Leith, which is now allowed to pass into the Water of Leith, and convey that sewage direct to the sea. The designs for this scheme of main drainage were made by Messrs.

Stevenson, M'Pherson, and Paterson, and the engineering details given in this paper are taken from the reports and evidence of Messrs. D. and T. Stevenson, under whom the works are being carried out. The drainage of North Leith is not proposed to be connected with the main drainage pipe, but is to be carried out independently by the Corporation of Leith, and the liquid is to be discharged into the sea by a special conduit. The drainage of South Leith, however, is to be intercepted by the main drainage pipe, and, along with the sewage of the Edinburgh district the whole is to be carried out to sea and discharged at the Black Rocks.

The cost of the main drainage works will be defrayed by an assessment for one year not exceeding 2*s.* 6*d.* per pound on the rental of those houses and premises which are within the drainage district and the parliamentary boundaries, and which contribute to the sewage; and as the rental of the Water of Leith district in Edinburgh is 456,108*l.*, and of South Leith 80,600*l.*, the total rental to be taxed is 536,708*l.* An assessment of 2*s.* 6*d.* in the pound on this sum will yield 67,088*l.* 10*s.*, and deducting five per cent. for the cost of collection, there is left a net sum of 63,734*l.* 1*s.* 6*d.*, to which there has to be added a sum of 4,000*l.* which the Leith Docks Commission have agreed to give in support of the scheme, making in all the sum of nearly 68,000*l.* as the available funds for carrying out this important sanitary measure.

The Water of Leith, which is at present contaminated with the sewage matter to be diverted into the main drainage pipe, is comparatively a small stream, and whilst during the winter months and after rain there is a current of water passing down its bed, yet in summer and dry weather the whole of the natural water of the stream is diverted into mill-lades which traverse the whole course of Edinburgh, and there is little or no natural water in the bed of the river as it passes Edinburgh. Into this small stream of water there is discharged the sewage of 70,000 of the inhabitants of Edinburgh, and upwards of 30,000 of the people of Leith, and the result has been that the bed of the Water of Leith has become a foul polluted stream, conveying fæcal matter of the most disgusting and abominable character, and evolving fœtid emanations into the surrounding atmosphere. In many parts of its course through Edinburgh the bed of the Water of Leith is rocky and uneven, and in the pools thus formed much of the solid matter conveyed by the sewage stagnates, and, passing into a state of putrescence, evolves abundantly offensive gases. Larger accumulations of fæcal matter are arrested by the mill-dams, and, indeed, the numberless pools in the bed of the Water of Leith, and the various dams, form numerous cesspools open to the air, which are practically hot-beds of decomposing filth.

The Water of Leith, before it reaches Edinburgh, is essentially a mountain stream, the waters of which are originally of a mossy or peaty nature, and the faint brown tinge of colour which it exhibits at its sources, is much deepened as it passes several paper mills and other public works which discharge liquid matters into the stream. The run of water is always kept up from large compensating reservoirs, which retain much water during the wet seasons, and discharge it at a regular rate during the periods of drought. These compensating reservoirs owe their construction to the withdrawal of the spring water which previously flowed into the Water of Leith and which has been diverted into Edinburgh by the Water Company for the supply of the city, as well as of the towns of Leith and Portobello. The mill-

owners on the Water of Leith compelled the water company to provide storage-room sufficient to hold eight months' supply of the spring water abstracted, but in reality the compensation reservoirs hold more than the quantity rendered imperative by the various Acts. In 1849 the amount of spring water abstracted by the water company was from 150 to 200 cubic feet per minute, and in 1859 other 200 cubic feet per minute were taken, making altogether about 400 cubic feet per minute of spring water abstracted from the Water of Leith in its upper parts, and which, being transmitted through pipes to Edinburgh for service there, is returned back again, in good part, to the Water of Leith by the drains and sewers.

The compensation reservoirs constructed in lieu of the spring water, and which send down a regulated supply of water into the bed of the Water of Leith, are of large size. There are two reservoirs about eight miles distant from Edinburgh, at the base of the Pentland Hills, viz., those of Harelaw and Thriepmuir, which cost about 36,000*l.*, and a third reservoir, about 13 miles from Edinburgh, also at the base of the Pentland Hills which is called Harperrig reservoir, which cost about 25,000*l.* The latter reservoir is bound to store 85,000,000 cubic feet of water above the level of six feet from the top of the offlet-pipe, but it actually stores 90,000,000 cubic feet above that level. The total capacity of these compensation reservoirs is sufficient to store 150,000,000 cubic feet of water, and in dry weather they discharge into the Water of Leith, according to the state of the weather and the demands of the mills, from 1,000,000 to 1,500,000 cubic feet of water per day, which is at the rate of 700 to 1,050 cubic feet per minute. As only about 50 cubic feet per minute are allowed to escape from Saturday evening till Monday morning, there is a saving of the water to the extent of about one sixth of the available power.

The water supply of Edinburgh is necessarily connected directly with the sewage of the city. In 1681 certain springs were brought in by the town council from the lands of Comiston, and in 1762 a 4½-inch wooden pipe was employed for the conveyance of water from certain springs rising in the estate of Swanston on the northern side of the Pentlands. The supply of water from these sources, however, was very uncertain in quantity, and varied from 12 cubic feet to 60 cubic feet per minute. In 1822 a further supply of water was obtained from Glencorse, and the Crawley spring on the southern slope of the Pentland Hills, and the increase was sufficient to give an average flow of water of about 250 cubic feet per minute. In 1848, by the abstraction of a number of springs on the northern slope of the Pentlands, and which originally flowed into the Water of Leith, the average supply of town water was increased to 460 cubic feet per minute; and in 1859 further springs on the northern side of the Pentland Hills were acquired, and the supply was increased to upwards of 700 cubic feet per minute. During the course of the last 20 years, therefore, schemes have been carried out whereby about 400 cubic feet of spring water per minute have been abstracted from the streamlets which feed the water of Leith, making altogether the large amount of 210,000,000 cubic feet per annum, and in lieu thereof compensating reservoirs have been constructed which can store 150,000,000 cubic feet, or more than eight months' supply of the springs. Besides the regular delivery from these reservoirs of sufficient water for the motive power of the mills, there is an additional supply of clear spring water conveyed in special pipes to the paper mills, glue works, and washing establishments to the extent of a constant run of 42 cubic feet per minute, and this extra amount of water, when used in the operations of paper making, &c.,

is also discharged into the Water of Leith. Considering the great expense connected with bringing in the spring water, and the cost of the compensation reservoirs, &c., which, altogether, entailed an expenditure on the part of the Water Company of 500,000*l.*, it is calculated that the 750 cubic feet of water per minute at present delivered each day in Edinburgh, Leith, and Portobello has cost the Water Company at the rate of 666*l.* for each cubic foot of spring water rendered available for town use during each minute.

The special investigations relating to the contamination of the Water of Leith by the sewage of Edinburgh were commenced on the 14th March 1864, and were continued almost daily for five weeks, and they were resumed on the 20th May, and were carried on for other 10 days. The principal sewers and drains were examined in all conditions of weather, and at all hours of the day and night, and similar observations were made on the Water of Leith, above Edinburgh, during its transit through the city, and onwards till it passed out of the harbour of Leith to seawards.

The examination not only included the liquids with mechanically suspended organic matters, as collected from the sewers and the Water of Leith, but likewise took cognizance of the sedimentary matters which lodged in the drains and the bed of the streams down to and including the harbour of Leith ; as also the gases evolved from these decomposing sedimentary matters ; the gases dissolved in the various liquids ; and the state of the atmosphere immediately above the districts where the drains and the Water of Leith were conveying sewage. The numerous chemical analyses proved the foul condition of the matters carried by the sewers into the Water of Leith ; and the offensive state of the stream itself, and indeed the senses of sight and smell were sufficient to show that the sewage had converted the Water of Leith into a great public nuisance, which it was desirable to get rid of. Many of the inhabitants of the district immediately bordering on the stream complained bitterly of the offensive odours which rose from the water, and which gave rise to nausea and sickness, and compelled them to keep their doors and windows shut. Moreover, Professor Simpson showed from the statistics of the mortality in the streets bordering on the river, as compared with those away from its banks, that there was a greater death-rate in the immediate neighbourhood of the Water of Leith than at a short distance therefrom. Thus, taking a similar class of houses in the Edinburgh district, and judging by the mortality amongst children under five years of age, Professor Simpson found that in the streets away from the influence of the foul water the mortality was in the proportion of 100, whilst in the streets near the Water of Leith the mortality was as high as 160. In the Leith district also the death-rate was greater, as in the streets at some distance from the harbour the mortality was in the proportion of 100, with a death-rate among children under five years of age of 1 in 12 ; whilst in the same class of streets near the river and harbour the mortality was at the rate of 141, and the death-rate among children one in seven. These statistics are positive evidence of the effects of the foul, filthy, and offensive state of the Water of Leith conveying the sewage of Edinburgh and Leith, and the results are supported by the concurrent testimony of many persons who reside in the immediate neighbourhood of the Water of Leith, and who speak as to the nausea and sickness which are brought on by the inhalation of the gases and vapours evolved from the water, and to the general ill-health connected therewith.

II. *The liquid Discharges from the Sewers of Edinburgh and Leith.*

The sewage drainage area of Edinburgh and Leith which discharges into the Water of Leith is about 611 acres, of which Edinburgh contributes 514 acres and Leith 97 acres. This area does not include the gardens and open spaces, but merely that which is built upon and contributes to the quantity of sewage. The maximum discharge of sewage from this area is 574 cubic feet per minute, and whilst there are no less than 180 large and small sewers which empty their contents into the Water of Leith,—the majority of these are small,—and there are only six main sewers which convey the fæcal matters from Edinburgh, and two principal sewers which receive and discharge the sewage of South Leith into the river and harbour of Leith. The average amount of day discharge of sewage per acre of ground built upon ranges from $\frac{8}{10}$ths to $\frac{9}{10}$ths of a cubic foot per minute, but the proportion varies much from day to day and from hour to hour. The greatest daily discharge occurs on Mondays and Tuesdays, as on those days the majority of family washings takes place, and on these occasions the full amount of 574 cubic feet per minute is attained. On Wednesdays and Thursdays the proportion of sewage is less, and on Fridays and Saturdays it is still further diminished, and indeed, on those days it does not average more than four-fifths of the discharge of Monday and Tuesday. The quantity of sewage is greatest at 11 o'clock in the forenoon, after which it diminishes till about five o'clock in the morning, it falls to about one-half, after which it increases gradually till 11 o'clock forenoon, when the maximum is again attained. The sewage water is in the most filthy state in the forenoon, and during the evening it is comparatively clear of fæcal matter.

The main sewers which convey the fæcal matter from Edinburgh into the Water of Leith are the Lochrin Burn, which discharges itself into the stream at Coltbridge, a short distance west of Edinburgh; the South or Moray Place sewer, which flows into the bed of the Water of Leith at Stockbridge; the North sewer, which also discharges at Stockbridge; the Canonmills sewer, which joins the Water of Leith at Canonmills; the Broughton Burn, which empties its contents into the stream above Junction Road Bridge, Leith; and the Bulls Stank sewer, which flows into the harbour of Leith, immediately below the Junction Road Bridge at Leith (see Plan of Edinburgh and Leith). The two latter are mainly Edinburgh sewers, but as they traverse the outskirts of Leith before they join the Water of Leith, a small portion of the sewage of Leith is conveyed by them. The principal sewers which carry the fæcal matter from South Leith are the St. Andrew's Street drain, which enters the harbour as the Coal Hill sewer, and the Bernard Street drain, which empties its contents into the harbour by the Lower Drawbridge sewer. In the chemical examination of the contents of these sewers, portions of the discharges were collected at different periods of the day and night, and during the six days of the week, so as to ensure that the condition of the sewage at all times should be fairly represented. Moreover, during the earlier observations in the spring of the year, viz., during March and April, the weather was often boisterous and wet, whilst during the summer observations, viz., in May, the weather was comparatively fine and dry, so that the average of the various samples collected at the different periods will fairly represent the mean composition of the sewage discharges during the year. The influence which these sewage matters can have upon the Water of Leith will be best considered by referring to the main

sewers individually, and observing especially the nature of their discharges at different times.

The Lochrin Burn, which is one of the main sewers of Edinburgh, has its rise in the house drains south of the castle, and thereafter travels in a westerly direction, collecting the sewage of many streets of houses in the west end of the city, and the drainage of the Edinburgh Abattoir and of the Caledonian Distillery. The total drainage area which falls into this burn is about 860 acres, but the built-on area or space is only about 100 acres, and taking the mean proportion of nine-tenths of a cubic foot per minute for each acre as the average amount of house sewage, the calculated quantity of domestic drainage-water would be 90 cubic feet per minute, which is really the full amount of the observed quantity. Thus, by actual measurement, it was found that at about eleven o'clock in the morning the discharge from the Lochrin Burn was 98 cubic feet per minute, and at a quarter past nine in the same evening the discharge fell to 51 cubic feet per minute, whilst in the succeeding morning at half past five the quantity rose to 69 cubic feet per minute, and at 11 o'clock in the forenoon to 92 cubic feet per minute. The average of all the measurements gave about 60 cubic feet per minute. During the summer in dry weather there is little if anything but sewage in the Lochrin Burn. There is a small drain which joins the Burn at Dalry, and which runs at the rate of about 3 cubic feet per minute, but this is the only accession which is worthy of note. During its course through the built-on area the Lochrin Burn is a covered drain or sewer, but when it emerges into the country districts on the west side of Edinburgh it becomes an open ditch or burn, and before it reaches the Water of Leith it is partially employed in the irrigation of a number of fields. The irrigation processes are carried out at intervals during the winter months, and somewhat regularly during the summer months, and tend to lessen not only the actual quantity of liquid which flows in the burn, but also to decrease the proportions of dissolved and suspended matters contained therein.

The sewage conveyed by the Lochrin Burn was collected at three different stations, one of which was immediately after the burn received the drainage of the Edinburgh Abattoir, a second station was immediately above the entrance of the liquids discharged from the Caledonian Distillery, and the third place of collection was immediately before the burn entered the Water of Leith at Coltbridge. 18 samples of sewage were collected at the first station in Lochrin Burn, and the details of the chemical analyses are given in Table A. The average composition of the 18 samples showed, that the liquid contained in one imperial gallon in a state of solution 12·36 grains of organic matter with 26·61 grains of saline matter, and in suspension 33·06 grains of organic matter with 24·66 grains of earthy matter, in all 45·42 grains of organic matter, and 51·27 grains of saline and earthy matter, making a total of 96·69 grains of organic and saline and earthy matters dissolved and suspended in one imperial gallon. 15 samples of sewage were collected at the second station, which was before the Lochrin Burn reached the Caledonian Distillery, and the details of the examination of these are given in Table B. The average of those samples gave of dissolved and suspended organic matter 44·38 grains, and of saline and earthy matters 34·49 grains, making 78·87 grains in one imperial gallon. Immediately after passing the second station, the Lochrin Burn receives the discharges from the Caledonian Distillery, and these consist mainly of dreg obtained from the stills. The analyses of three samples of dreg are given in Table B., and

the average composition of two samples of this substance in one imperial gallon gives 611 grains of organic matter, and 118 grains of saline and earthy matters. The discharge of this dreg is very irregular, but it must tend to increase materially the proportion of matters dissolved and suspended in the sewage matter of the Lochrin Burn, and as it is of a putrescible nature, it adds to the foul condition of the water. The third station on the Lochrin Burn, or that immediately preceding the discharge of the burn into the Water of Leith, is the principal one in regard to the contamination of the stream, as the liquids are collected just before they pass into the Water of Leith. At this station 20 samples of liquid were collected on different days, and at different hours, and the details of the analyses are given in Table C. The average of the 20 samples yielded in one imperial gallon in a state of solution, 31¼ grains of organic matter and 26½ grains of saline matter; and in a state of mechanical suspension, 29¼ grains of organic matter and 9 grains of earthy matter: making 60½ grains of organic and 35½ grains of saline and earthy matters, and altogether 96 grains of dissolved and suspended matters in the imperial gallon. In every instance the liquid from the Lochrin Burn was in a foul and offensive condition, and evolved a fœtid disgusting odour. This was specially observable on those occasions, when there was an appearance of blood in the water coming from the abattoir; and during the times that dreg was issuing trom the Caledonian Distillery a sour nauseous odour predominated.

The Lochrin Burn is the first Edinburgh sewer which discharges itself into the Water of Leith, and though the direction of the burn is westerly in its flow, yet, when it discharges into the stream, it is carried in an easterly direction back through Edinburgh and Leith, before it passes to the sea on the east coast. After the reception of the Lochrin Burn, the Water of Leith receives the discharges of numerous small sewers and drains as it flows through the Water of Leith village, and when it reaches the district of Edinburgh, known as Stockbridge, two large main sewers discharge their contents into the stream. These sewers are the South or Moray Place sewer, which collects the house-drainage of a built-on area of about 20 acres, though the total drainage area is about 30 acres. The discharge of sewage has never been gauged above 18 cubic feet per minute. The North sewer at Stockbridge likewise receives a large amount of house sewage from a built-on area of 23 acres. 22 samples of the liquid discharges from these sewers were analysed (see Table D). The average of 10 samples from the North sewer gave in solution and suspension in one imperial gallon 21½ grains of organic matter and 33 grains of saline and earthy matter, in all 54½ grains; whilst the average of 12 samples from the South or Moray Place sewer gave 31¾ grains of organic matter and 35 grains of saline and earthy matter, in all 66¾ grains of dissolved and suspended matters in the imperial gallon.

From Stockbridge the Water of Leith flows down in the direction of Canonmills and receives on its way the contents of numerous small drains, and at Canonmills a large sewer discharges itself into the stream. This sewer, which is known as the Canonmills sewer, collects the sewage from a drainage area of 171 acres, of which 116 acres are built upon. The analyses of 21 samples of the liquid conveyed by this sewer are given in Table E., and the average proportions in one imperial gallon are 23¾ grains of organic matter and 35 grains of saline and earthy matter in solution and suspension, making in all 58¾ grains. After this accession of sewage matter, the Water of Leith passes down to the outskirts of Leith where the Broughton Burn sewer, which

carries much Edinburgh sewage accompanied by the drainage of an outlying district of Leith, joins the stream. The average of two samples of the Broughton Burn sewage (Table F.) gives 48 grains of organic matter and $42\frac{3}{4}$ grains of saline and earthy matter in one imperial gallon, in all $90\frac{3}{4}$ grains. Flowing still further seaward, the stream passes into the harbour of Leith, and at the upper end of which the Bulls Stank sewer, which mainly flows from Edinburgh, discharges its contents. One analysis of the contents of this sewer was made at Lovers Loan immediately after the sewer leaves Edinburgh proper, and other four samples were collected from the sewer as it discharged into the harbour of Leith. The liquid of this sewer contained an average of $16\frac{3}{4}$ grains of organic matter and $36\frac{3}{4}$ grains of saline and earthy matter, in all $53\frac{1}{2}$ grains in the imperial gallon (Table F). Thereafter the Coal Hill sewer, which is very foul, conveying fæcal matter from Leith, discharges its contents into the harbour. The mean analysis of three samples of the discharge from the Coal Hill sewer (Table F.), which is also called the St. Andrew's Street drain, showed the large proportion of 145 grains of dissolved and suspended organic matter, and 182 grains of saline and earthy matter, making in all 327 grains of matter in one imperial gallon. And amongst others, another large Leith sewer, known as the Bernard Street drain, pours its contents into the harbour at the side of the Lower Drawbridge, and the liquid discharged therefrom contains $18\frac{1}{4}$ grains of organic matter and $51\frac{1}{4}$ grains of saline and earthy matter, in all $69\frac{1}{2}$ grains in the imperial gallon.

Whilst the Coal Hill sewer and the Lower Drawbridge sewer are the principal sewers which convey the house drainage of South Leith into the harbour, there are many smaller drains which discharge their contents into the water not only on the South-east side, but also on the North-west side of the harbour.

The general appearance of the matters discharged by the Edinburgh and Leith sewers into the water of Leith was foul, fæcal, and offensive. The night discharge, or that occuring between 11 P.M. and 5 A.M., was comparatively free from gross pollution, but at all times the contents contained sufficient organic matter in solution and suspension to cause putrefaction when retained in a vessel for a short time. Even when the liquids were filtered through bibulous paper, at the moment of their collection, the filtered liquid, though comparatively clear, yet contained much organic matter in solution, possessed a fœtid odour, gave a foul taste, destroyed the colour of a large amount of permanganate of potash, and when kept for a short time passed into a state of putrefaction. The number of samples of sewage liquids collected from the drains and sewers of Edinburgh and Leith, and analysed by me amounted to 107, and these were taken during all states of the weather, and at all times of the day and night. In every instance the water was more or less contaminated with flocculent matter, principally of organic origin, and on being allowed to settle, the suspended matter fell to the bottom of the vessel.

III. *Sedimentary Matters in the Sewers of Edinburgh and Leith.*

The more solid part of the sewage conveyed by the drains, tends to deposit whenever the rapidity of the current is lessened, and whilst in the ordinary sewers there is no great accumulation of sedimentary matter, yet the Lochrin Burn, the Bulls Stank sewer, and the Broughton Burn are somewhat sluggish in their movements, and hence at many parts of their course much foul deposit is found. This was spe-

cially observable at the parts of the course of these drains where they run as open ditches. At the Lochrin Burn sewer, west of the abattoir, a large amount of sedimentary matter was found, and the average of seven samples (Table G.) gave when dried 49⅔ per cent. of organic matter, which contained a considerable amount of nitrogen, and when lying in the bottom of the sewer was in an active state of putrescence, and evolving abundantly offensive and noxious gases. A similar observation was made at Lochrin Burn sewer immediately before it arrived at the Caledonian Distillery, where the bed of the sewer was more or less covered by decomposing and putrefying matters, and the average of three samples of sediment collected at this point (Table G.) gave 27⅔ per cent. of organic matter containing nitrogenous and putrescent elements. At the Lochrin Burn sewer, immediately before it discharged into the Water of Leith above Coltbridge, much sediment was also found, and whilst it was likewise of an active putrescent nature, it was mingled with more fine earthy matter. The average of three samples (Table G.) gave 17 per cent. of organic matter containing nitrogen. Sedimentary matter was also collected in quantity from the Bulls Stank sewer at Lovers Loan immediately after leaving Edinburgh (Table G.), and contained 50¼ per cent. of organic matter of a nitrogenous nature. And similar organic sediments were found in the Broughton Burn at the Bonnington Road, and just before the burn enters the Water of Leith (Table G).

The solid matters which form these sediments in the various sewers where the run of water is slow, are in a state of active putrescent fermentation, and are not only hurtful whilst present in the sewers by giving off abundantly fœtid exhalations of noxious gases, but whenever a shower of rain falls and the amount of water and the rapidity of the flow increases, these sedimentary matters are swept onwards and are discharged with the ordinary liquid sewage into the bed of the Water of Leith. The results are that when the rain is limited in quantity, much sedimentary matter is thus thrown into the stream and lodges in the uneven bed, though when the weather is broken and much rain falls, the sedimentary matters are swept onward by the current and discharged into the sea. The quantity of such sedimentary matter which is lodged in the bed of the Water of Leith throughout its course will be presently referred to, and the nature of the gaseous emanations from those putrefying sediments will also be described in detail.

IV. *The Water of Leith.*

The offensive state of the water and harbour of Leith, due to the discharge of the sewage of 70,000 of the inhabitants of Edinburgh and 30,000 of the inhabitants of Leith, has necessarily called forth public attention on several occasions for the purpose of adopting some means for the arrestment of the evil. Accordingly, in 1854, operations were commenced for the purpose of aiding to some extent in the removal of the fulsome discharges by providing a more rapid run of water at certain parts. The original and natural bed of the Water of Leith is of a very uneven and rocky nature, and being of some width, the small amount of water which accompanies the sewage, except in floods, is only sufficient to diffuse it over the bed of the stream and convey it down in a sluggish manner, which admits of a great deal of the solid matter being deposited in the rocky pools and cavities and on the banks of the stream. The measures adopted in 1854 were restricted to a part of the Edinburgh district, and were confined to the improvement of the bed of the river for only a mile

and a quarter in length, from St. Bernard's Bridge to St. Mark's Place, with a break of about 200 yards at the ford at Malta Green. The pools in the stream were filled in and the shallow and deep places were levelled, whilst the channel was narrowed by making a run in the centre of the bed of the river, by filling in the banks with stones, and keeping the run clear by wooden planks being placed along each side. Open iron conduits were also laid at the sides of the narrowed channel so as to convey the sewage from the drains into the central run. It was also proposed that when the matters had been conveyed down to St. Mark's Place, that the foul water should be there subjected to some deodorising process. The latter part of the scheme was never attempted, but the narrowing of the channel was carried out.

Arrangements were also made for the flushing of the central run by diverting water from the mill-lades for a few hours, once a fortnight, and for the liberty of using the water in this way the sum of 30*l.* a year was arranged to be paid to the mill owners.

The scheme for the levelling of the bed of the stream and the confining of the run of water and sewage was no doubt effectual in arresting the deposition of large quantities of decomposing filth at certain parts of the stream, but it was only a partial benefit. No improvement was effected in the bed of the river above where the run was restricted, and in those upper parts, as behind Ainslie and Moray Places, the numberless pools in the rocky bed still admitted of the deposition of large quantities of putrescent sediment. Moreover, the narrowed channel was not free from sedimentary organic matter, and in most places the slightest agitation of the bottom gave rise to the evolution of numberless bubbles of gas. And again, whenever the water rose a little, overflowed the narrow channel, and then subsided, it left on the banks much organic sediment which filled up the spaces between the stones, and being alternately moistened and dried, and acted on by the sun's rays, emitted much offensive effluvia. Whilst the nuisance was not entirely abated in those parts of the stream where the channel was narrowed, the working out of the scheme led to the more ready conveyance of large quantities of offensive material to St. Mark's Place, below which there is a mill-dam or caul, and the water being there kept back, became extremely sluggish in its movements and deposited much of the suspended matters. The result was the accumulation at this part of a foul deposit of considerable depth, and in a state of active putrescent fermentation. This place was essentially an enormous cesspool, near the upper end of which there were stepping stones (now a bridge), and on numerous occasions especially in summer weather, when there was occasion to use the stepping stones, the foul fæcal condition of the Water of Leith was plainly observable, and the highly offensive exhalations which emanated therefrom in the warmer seasons of the year were such as to produce an intolerable stench.

The improvements in the condition of part of the bed of the Water of Leith which were commenced in 1854 did not therefore provide for the abstraction of sewage from the Water of Leith, or for the arrestment of the discharge of impurities thereinto, but it merely arranged for a partial alleviation of the evil in one district of Edinburgh. Whilst much of the stream above the narrowed part was left in its ordinary foul state, there was much left also below, and indeed from Edinburgh to Leith there was no abatement of the nuisance, and the harbour of Leith, as previously, continued to receive the sewage of 100,000 people. Matters were in this position when the corporations of Edinburgh and Leith instructed me, in conjunction with Professor Penny of Glasgow, to institute a full series of experimental observa-

tions on the nature of the sewage discharged into the Water of Leith, and the effect which that sewage had upon the stream itself and the harbour of Leith. The chemical nature of the sewage as discharged by the drains and sewers of Edinburgh and Leith has been already fully adverted to in this paper, and the details of the analyses made by me of these sewage matters are given in the tables. I have now to refer to the chemical composition of the Water of Leith as contaminated by the sewage; and in order that the effect of such may be correctly observed, I will first refer to the nature and condition of the Water of Leith before it reaches Edinburgh, and thereafter to its state when it receives the various accessions of sewage.

V. *The Water of Leith above Coltbridge.*

The sources of the Water of Leith are mainly derived from the upland districts on the Pentland Hills, and the waters originally are of a peaty or mossy nature. The water is collected in large compensating ponds or reservoirs; two of which are situated about eight miles west from Edinburgh, and the outlet from which is known as the Bavelaw Burn, and the remaining reservoir is about 13 miles west from Edinburgh, and its water flows into the head stream of the Water of Leith (see Map). The Bavelaw Burn joins the Water of Leith above the village of Currie, about six miles west from Edinburgh, and the two streams then flow on to Edinburgh as the Water of Leith. There is a flax ropery work and a paper mill on the Bavelaw Burn, and six paper mills, a washing establishment, and a glue work on the Water of Leith before it arrives at Coltbridge and mingles with the sewage of Edinburgh. The ropery and the paper mills discharge considerable quantities of dark-coloured alkaline solutions from the boilers in which the flax, rags, and esparto fibre have been boiled, and these discharges tend to increase the quantity of saline and organic matters dissolved in the water, as may be seen from Table H., where the analyses are given of eleven samples of water from the Water of Leith before it reaches the neighbourhood of Edinburgh, and also the analyses of 23 samples collected immediately above Coltbridge and just before the contamination of the stream with the sewage conveyed by the Lochrin Burn From the latter analyses it will be observed that the average of these 23 samples gives 5 grains of organic matter and $15\frac{1}{4}$ grains of saline matter in one imperial gallon, in all $20\frac{1}{4}$ grains. The discharges from the ropery company and the paper mills contain much alkali, soluble silica, and some organic matter dissolved therein, accompanied by the washings of the boiled rags, and the water from the washing and beating engines and paper machines. These fluids tend to communicate more or less of a yellow brown colour and slight alkalinity to the Water of Leith, but they do not leave any deposit on the stones in the bed of the stream or on the banks thereof. So far as the chemical observations were carried out, there was no appearance of a putrefactive tendency in the contents of the water as it arrived at Coltbridge as a running stream, and though the water was not to be commended for dietetic use and ought not to be employed for such, yet there were no offensive gases escaping therefrom, and therefore there was no evidence of the contamination of the neighbouring atmosphere by exhalations which might be regarded as unwholesome. There are several villages situated on or near the banks of the Water of Leith before it arrives at Coltbridge, but these villages have no regular system of house drainage, and hence the water is not materially contaminated with sewage in its upper parts, and certainly, when it

arrives at Coltbridge, it does not contain an appreciable trace of house sewage.

VI. *The Water of Leith from Coltbridge to the Harbour of Leith.*

Whenever the Water of Leith arrives at Coltbridge and the Lochrin Burn mingles its sewage therewith, then the water begins to assume an offensive appearance, acquires a fœtid odour and taste, and when kept for a short time becomes putrescent. After receiving the sewage, the proportions of organic and saline matters increase in quantity. Samples of the water at all the principal points in its course through Edinburgh and Leith and passing out into the harbour, were collected at different times and subjected to analysis (Tables I., K., L., M., and N.) This part of the stream divides itself into five distinct portions :—

I. From Coltbridge down to the dam below Water of Leith village, where much of the water is at all seasons diverted into the lade which traverses the whole length of Edinburgh, and where, in ordinary dry summer weather, the whole of the liquid flows into the lade.

II. From the dam below Water of Leith village, where the lade diverges from the main stream, down to St. Mark's Place.

II. The lade which commences at the Water of Leith village, and, after traversing Edinburgh, is again united with the Water of Leith at St. Mark's Place.

IV. The Water of Leith at St. Mark's Place after the stream and lade with their Edinburgh impurities have commingled, and,

V. From St. Mark's Place down to and including the harbour of Leith.

The first part of the district comprehended from Coltbridge down to the dam below the Water of Leith village contains the natural flow of the stream, accompanied by the sewage of Lochrin Burn and numerous smaller sewers and drains. In dry or summer weather the amount of liquid which flows down this part of the stream is about 1,600 cubic feet per minute, and there are three mill-dams or cauls which retard the motion of the water and allow of sedimentary matter being deposited. These mill-dams also cause the whole of the water in the stream in dry or summer weather to be diverted into the lades, and necessarily at these parts there is no fall of water in the bed of the stream during such periods. The liquid of the stream or lade, however, still retains much organic matter in solution and suspension. Eleven samples of liquid were collected from this district and subjected to analysis (Table I.) and the average of these samples gave, in one imperial gallon, $9\frac{3}{4}$ grains of organic matter and $16\frac{1}{4}$ grains of saline matter, in all 26 grains.

The second district begins at the dam below the Water of Leith village and terminates at St. Mark's Place, and it is peculiar in this respect, that whilst during ordinary dry summer weather there is no flow of water over the dam, there is, at other times, a small portion passing over, and it is only during flood time that a decided flow of water is seen below the dam. The comparatively dry bed of the Water of Leith, however, very soon receives accessions of water, partly by leakage from the sides of the lade which flows for some distance alongside of the stream at a higher level, and in other part from numerous small drains conveying house-sewage. Six samples of liquid were examined from the Water of Leith under the Dean Bridge, six samples from the stream behind Moray Place and near St. Bernard's Well,

and six samples from the Water of Leith above Stockbridge (Table K.), and the mean of the analyses of these samples gave about 10 grains of organic matter and $16\frac{1}{4}$ grains of saline matter in the imperial gallon, in all $26\frac{1}{4}$ grains. At Stockbridge, however, the water receives the contents of two large sewers (the South or Moray Place sewer and the North sewer), and nine samples collected about 30 yards below the point of discharge of these sewers at Stockbridge (Table K.) gave an average, in one imperial gallon, of 9 grains of organic matter and $15\frac{1}{2}$ grains of saline matter in solution, and $14\frac{1}{4}$ grains of organic matter and $2\frac{1}{2}$ grains of earthy matter in suspension, in all $23\frac{1}{4}$ grains of organic matter and 18 grains of saline and earthy matter dissolved and suspended in the Water of Leith at this point. Another station behind Warriston Crescent and below the entrance of the Canonmills sewer gave similar evidence of the contamination of the water (Table K.)

The Edinburgh lade district commences at the dam below the Water of Leith village ; it is one of six lades which receive the Water of Leith between Coltbridge and the sea, and each of which has its appropriate mill-dam. These lades take in all the river-water as well as the Lochrin Burn during the ordinary dry weather in summer, and the amount of water in the lades is about 1,600 cubic feet per minute. The principal lade is the one which traverses Edinburgh and which begins at the Water of Leith village. Generally it runs as an open ditch, occasionally washing the sides of the houses, passing through below houses and under the streets, and ultimately arrives once again at the Water of Leith at St. Mark's Place. The lade and its contents were specially examined behind Ainslie and Moray Places, and behind India Place, where the wall of the houses is actually the side of the lade, and where spouts standing out from the houses discharge the contents of household sinks and closets directly into the lade. At Clarence Street, where the lade passes below the houses ; at Eyre Place, where it flows in front of the houses, as well as at Beaver Hall, and immediately before the junction of the lade with the stream, and indeed at all parts of the course of the lade, the liquid was foul and fæcal, and the average of eight samples collected at two different stations (Table L.) gave $10\frac{3}{4}$ grains of organic matter and $18\frac{1}{4}$ grains of saline and earthy matters, in all 29 grains, dissolved and suspended in one imperial gallon.

The district of St. Mark's Place is interesting as the spot, where the Water of Leith conveyed in the lade once again joins the stream, and at this point the effect of the greater part of the Edinburgh sewage upon the natural water of the river is best observed. The pool of water at St. Mark's Place is of considerable length and depth, and the flow of the water is retarded by a mill-dam at a little distance below. The liquid presents a most offensive appearance, and contains much organic matter in mechanical suspension as well as in solution. Much putrifying organic matter lies at the bottom of the pool, and indeed the district is an enormous cesspool. The decomposing sediment is constantly evolving numberless bubbles of noxious gases, the disengagement of which causes a constant commotion in this comparatively stagnant pool, and tends to keep much matter in a state of mechanical suspension in the water. The fulsome condition of the Water of Leith at this district, especially in a warm summer day, is highly disgusting and abominable. 18 samples of the liquid were collected from the Water of Leith at St. Mark's Place (Table M.), and the average of these samples gave in

one imperial gallon 8 grains of organic matter and $14\frac{3}{4}$ grains of saline matter in solution, and $18\frac{1}{2}$ grains of organic matter and $15\frac{1}{4}$ grains of earthy matter in suspension: in all $26\frac{1}{2}$ grains of organic matter and 30 grains of saline and earthy matter in solution and suspension. The foul appearance of the liquid at St. Mark's Place was increased during the warmer months by floating patches of organic matter bouyed up by the gases evolved during the putrefaction of the mass, and which not only served to keep such matter floating, but also were successful in raising from the bed of the pool a constant succession of new aggregations of decomposing matters.

The fifth district extends from St. Mark's Place down to the harbour of Leith, and 13 samples of water were collected at 10 different places (Table N.). One sample was from the dam above Bonnington, which is the lower end of the pool which extends up to St. Mark's Place; one sample was taken from the Water of Leith at the boundary of Edinburgh and Leith at Bonnington Bridge; another sample from the dam above Junction Road Bridge; one sample from the Water of Leith above the saw mills at Leith; two samples from the harbour of Leith below the Junction Road Bridge; three samples from the harbour above the Coal Hill; one sample from the harbour in front of the Coal Hill sewer; one sample from the harbour at the upper drawbridge; one sample from below the upper drawbridge; and one sample from the harbour off the Victoria Dock-head. Several of these samples were very foul from the large amount of suspended organic matter, and in all cases there was sufficient putrescible matter present to cause the liquid to exhibit a fœtid, nauseous odour, and a turbid and nasty appearance.

The special conclusions which are to be drawn from the observations on the water of the Water of Leith from Coltbridge down to the sea, and the relative analyses, are that whilst the water is comparatively free from impurity before being contaminated by the sewage, and is not liable to become putrescent, yet, the moment the sewage enters the stream the water is rendered foul, and as the drains increase in number and discharge their fæcal contents into the stream, the nuisance increases. At no time after the Lochrin Burn enters is the water free from the power of passing into a state of putrescence. Even when filtered on the spot at many different stations, the liquid which was obtained, though somewhat clear and transparent, yet contained more or less organic matter, had a foul taste and a fœtid odour, destroyed the colour of much permanganate of potash, and when allowed to stand for some days passed into putrefactive fermentation and evolved stinking gases.

VII. *The Sedimentary Matters in the Bed of the Water of Leith.*

The solid matters which the sewers of Edinburgh and Leith carry in mechanical suspension into the Water of Leith are deposited in large quantities in ordinary seasons in the pools or cavities in the rocky bed of the stream, and also at the bottom of the still water which is found above all the six mill dams or cauls.

Immediately below the entrance of the Lochrin Burn into the Water of Leith at Coltbridge a bank of deposit of decomposing solid sewage matter, several feet in depth, lies putrefying and exhaling foul gases, and from this point to the mill-dam at a short distance below, the fermenting sediment is more or less deep, and indeed from this station down to the harbour of Leith, the bed of the Water of Leith,

including the part where the channel is narrowed, and also the bottom of the lade, are covered more or less thickly with putrefying sediment (Table O.). This was specially observable—

1. At the dam below Water of Leith village, where the foul deposit consisted on the average of four samples, of 48 per cent. of organic matter, containing nitrogen, and was in a state of active putrescence (Table O).
2. In the numerous pools in the rocky bed of the Water of Leith behind Moray and Ainslie Places, where the putrefying stuff is often two feet in depth, and contains on the mean of two samples 45 per cent. of organic matter with nitrogen (Table O.)
3. In the bed of the Water of Leith, below the North and South sewers at Stockbridge, where the average of eight samples washed up upon the banks gave 43½ per cent. of organic matter; a sample taken from the sides of the narrowed channel gave 34½ per cent. of organic matter ; a sample collected from the bottom of the narrowed run, 80 yards below Stock·bridge, gave 25 per cent. of organic matter ; and still further down, at Malta Terrace, the sediment in the bottom of the run gave 32½ per cent. of organic matter (Table O.). In all of these instances the organic matter was, as usual, of an offensive and putrescent nature, and contained a decided proportion of nitrogen.
4. In the bed of the Water of Leith, in front of the Canonmills sewer, which contained organic matter to the extent of 31¾ per cent. (Table O.).
5. In the narrowed channel behind Warriston Crescent, and in the bed of the Water of Leith at St. Mark's Place, after the junction of the Edinburgh lade, when the average of nine samples gave 36 per cent of organic matter containing nitrogen. From this point down to the dam above Bonnington there is a stretch of water of nearly half a mile nearly stagnant and overlying a foul deposit of from one to three, and even at its lower parts to four feet in depth. Indeed, this stretch of water is an enormous cesspool open to the air, and the sedimentary matter is in a state of active putrefaction. At the dam above Bonnington the sediment contained 49¾ per cent. of organic matter, accompanied by 1·4 of nitrogen (Table O.) ; and,
6. In the bed of the Water of Leith at the boundary of Edinburgh and Leith at Bonnington Bridge, where one sample gave 27 per cent. of organic matter ; below the junction of the Broughton Burn where the dried sediment contained 13¾ per cent. of organic matter, and at the dam above Junction Road Bridge, where the deposit is from one to two feet in thickness, and contained 27¾ per cent. of organic matter, accompanied by 0·7 of nitrogen.

The lades also, which now and again convey the whole or the major part of the Water of Leith, are not exempt from these organic sedimentary deposits. The lade which commences at the Water of Leith village, and traversing Edinburgh, is again discharged into the stream at St. Mark's Place, has an average deposit of 6 to 8 inches of organic matter at many places, and seven samples taken from the lade behind Ainslie Place, Moray Place, and India Place, and above Canonmills, gave the mean proportion of 25¾ per cent. of organic matter with 0·69 of nitrogen (Table O.).

In the harbour of Leith the putrefying deposit is diffused through a depth of one to two feet, and is necessarily mingled with fine sand

brought in by each tide. Samples of the deposit were collected at all the principal points on both sides of the harbour, and they were taken at a little distance from the banks so as fairly to represent the condition of the mud or deposit in the harbour. When the tide was out, it was observed that the whole bed of the harbour was composed of a black-coloured slimy foul deposit. 12 samples of the sedimentary matter lying towards the south-east side of the harbour gave an average of $28\frac{1}{3}$ per cent. of organic matter containing nitrogen, and 6 samples collected towards the north-west side of the harbour gave an average of 20 per cent. of organic matter with fully 0·60 of nitrogen (Table P).

These sedimentary deposits found in the river of Leith, from Coltbridge downwards to the harbour of Leith, and in all the mill lades connected therewith, are undoubtedly due to the discharge of the sewage of Edinburgh and Leith into the Water of Leith and the lades, and are not only foul and unsightly in themselves, but are far more noxious as hotbeds for the disengagement of unwholesome gases. The rapidity with which the gas escapes from these organic muds is such that at the dam-heads and in the harbour, the water floating above the putrefying stuff is perforated every moment with bubbles of gas, and so abundant are these that in many places the water presents the appearance of being a state of ebullition.

VIII. *The Gases evolved from the Muds or Sedimentary Matters.*

The gaseous emanations from the putrefying deposits in the bed of the Water of Leith, the lades, and the harbour, have received special attention in their examination. These gases are evolved more or less rapidly according to the depth of the organic mud, and the temperature of the season, and hence, in summer weather, the putrefactive processes proceeding more quickly, give rise to the disengagement of much gas even when the sediments are kept at rest, and lead to the evolution of large quantities whenever the deposit is agitated by a rod. In the bed of the Water of Leith, especially at Coltbridge, behind Ainslie and Moray Places, at St. Mark's Place down to the dam above Bonnington, at Bonnington Bridge, at the dam above Junction Road Bridge, and in the harbour of Leith, the disengagement of bubbles of gas is incessant and resembles a shower of rain falling. In the part of the Water of Leith where the channel is narrowed, as also in the lades, the evolution of gas is not so readily observed owing to the rapidity of the run of the water, but the slightest agitation of the bottom of the confined channels of the stream or of the lades at once causes the rapid disengagement of gases, so that there is no difficulty at any part of the Water of Leith from Coltbridge downwards in obtaining a good supply of gas for the purpose of examination as to its chemical composition.

In the collection of the gases, a bottle was filled with the water which was flowing over the deposit, and being inverted under the water with a funnel attached to the mouth, the sediment was agitated, when the bubbles of gas rose and entering the bottle displaced the water. A glass stopper luted with lard was inserted into the mouth of the bottle whilst under the water, and within three hours of the collection of the gases, the per-centage composition was determined by analysis. The results of the chemical investigation showed, that the gaseous emanations mainly consisted of gases which were combustible with a blue-white flame accompanied by smaller proportions of carbonic acid and oxygen. The proportion of the latter gas was small,

and there is little doubt that some at least of this oxygen may be regarded as derived from the gases dissolved in the water used in the collection and examination of the samples of air under analysis. The carbonic acid was determined by absorption with potash, and the oxygen was ascertained by the use of pyrogallic acid and potash, whilst the remaining gases were merely brought into contact with a lighted taper and observed to burn with a blue-white flame. The combustible gases which are well known to be evolved from decomposing plant and animal substances during putrefactive decay are marsh gas or light carburetted hydrogen, hydrogen, and carbonic oxide, and from the fœtid odour of the residual gas in all of the experiments, I have no doubt that these were accompanied, in the gases collected by me from those deposits of mud, by smaller proportions of other gaseous substances of a foul and noxious nature. In the majority of instances no traces of sulphuretted hydrogen were obtained when lead paper was introduced or when the odour of the gas was tried, but in the gases evolved from the sediment in the Water of Leith behind Warriston Crescent in Edinburgh, and that between the upper and lower drawbridges in the harbour of Leith, as also in those evolved from the mud off the jetty head at the entrance to the Victoria Dock, decided traces of sulphuretted hydrogen were obtained.

Fourteen samples of gas collected from sedimentary matters were examined. One sample of gas was taken from the mud or deposit in the Lochrin Burn sewer; two samples from the sediment in the bed of the Water of Leith at Coltbridge; two samples from the bed of the Water of Leith behind Moray Place; two samples from the sediment in the lade behind India Place; one sample from the bed of the Water of Leith below Stockbridge; one sample behind Warriston Crescent; two samples from St. Mark's Place; one sample from the dam at Junction Road Bridge; one sample from between the upper and lower drawbridges, and one sample from off the jetty head at the entrance to Victoria Dock (Table Q.). The proportion of carbonic acid in the gases ranged from 1·56 to 25·60 per cent.; of oxygen from 0·32 to 2·17 per cent.; and of other gases which were combustible with a bluish-white flame from 72·60 to 97 per cent.

The experimental results on the composition of the gases evolved from sedimentary matters in foul burns and waters teach the important doctrine, that the escape of sulphuretted hydrogen may scarcely, if at at all, be recognized, and yet large quantities of combustible gases, undoubtedly of organic origin, may be disengaged into the surrounding atmosphere, and consequently that the contamination of the air may occur without sulphuretted hydrogen being observed.

During the progress of these experiments attention was directed to a green substance consisting mainly of *Euglena viridis*, one of the Phytozoa, which was observed on the surface of the stagnating mud at the side of the Lochrin Burn, and in shallow parts of the Water of Leith as at St. Mark's Place, and which was said to neutralise in great part the deleterious effects of the gaseous exhalations, and even to lead to the disengagement of oxygen gas in large volumes. A considerable quantity of the green slime was separated as well as practicable from the underlying filthy sediment, and having been placed in a bottle till it was filled, the bottle was then inverted in a basin, and immediately gases began to be evolved. On testing these gases in about three hours, there were found carbonic acid 13·40 per cent., oxygen 1·60 per cent., and other gases, which were combustible with a bluish-white flame, 85 per cent. (Table Q.) It was proved, therefore, that this green slime does not practically lead

to the disengagement of oxygen, and indeed the gases which are evolved therefrom are essentially identical with those obtained from any foul deposit in a sewer or in water conveying sewage.

Moreover, the green slime, when collected from the surface of the sedimentary matter, and placed in a bottle which it filled about one third, and the remaining two thirds being left as common air, it was found that in 40 hours the composition of the atmosphere had so materially changed that a lighted taper was immediately extinguished on being introduced. A chemical analysis proved that the atmosphere left in the bottle contained 11·56 per cent. of carbonic acid, only 2·01 per cent. of oxygen, and 86·43 per cent. of other gases, which in their mixed state were not combustible and did not support combustion (Table Q.). These two experiments, therefore, demonstrated that practically the evolution of oxygen gas from the green slime covering a mass of putrescent filth was at a minimum and was highly problematical, whilst the disengagement from the mass, of carbonic acid and of combustible gases was undoubtedly certain. The green slime on being examined microscopically was found to consist mainly of minute organisms belonging to the *Phytozoa*, and which are alternately regarded as animals and plants. At present, the *Euglena viridis*, which forms a part at least of the green matter of these deposits, is considered to be a plant by some naturalists, and an animal by other authorities.

IX. *The Gases dissolved in the Waters of the Sewers and of the Water of Leith, &c.*

In all good natural waters there is present in solution a greater or less proportion of gaseous matter which the water has in great part dissolved out of the atmosphere. The gases present in healthy waters are carbonic acid, oxygen, and nitrogen; the two latter being in largest quantity, and the relative proportions of these two gases are, that for one volume of oxygen there are two volumes of nitrogen. These are not the proportions in which oxygen and nitrogen are present in the atmosphere, where there are for one volume of oxygen four volumes of nitrogen; but the greater solubility of oxygen than of nitrogen in water admits of a larger proportion of oxygen dissolving in the water, relatively, to the amounts of these gases in the atmosphere.

Two important offices are fulfilled by the oxygen which is dissolved in natural water. In the first instance, it supplies the air which fish require for their respiration, and without a due supply of which the fish become asphixiated and die; and, in the second instance, it oxidises any organic matters which pass into the water, and thus tends to purify the stream. It may be at once stated, however, that there is a certain limit to the power which oxygen possesses to consume organic matters, as in the act of doing so the oxygen enters into union with the elements of the decaying organic matter, and therefore ceases to be free oxygen, and cannot be recognised as such in the water. Moreover, whenever the oxygen has been used up in the decomposition of the organic matter, and there is still some refuse plant or animal substance left in the water, then putrefaction must follow and consequently foul gases be evolved.

The manner in which the oxygen dissolved in water acts upon foul matters contained therein may be observed from this, that organic substances principally consist of carbon, hydrogen, and oxygen, accompanied by a smaller proportion of nitrogen and minute quantities of sulphur and phosphorus; and where there is

oxygen dissolved in the water sufficient to act upon these, it oxidises the carbon into carbonic acid, the hydrogen into water, the nitrogen into nitric acid, the sulphur into sulphuric acid, and the phosphorus into phosphoric acid. Whenever the proportion of oxygen becomes exhausted, then the organic substance still lying beneath as sedimentary matter, or still floating along with the water cannot be oxidised, and must seek the elements of change within itself, and give rise to the disengagement of those combustible and foul gases which are characteristic of the putrefaction of refuse animal and vegetable substances.

In the examination of the gases dissolved in the waters of the sewers of Edinburgh, and of the Water of Leith, &c., I analysed the gases from 25 samples of water, and the details of the analyses are given in Table R. The spring-water, which is conveyed to Edinburgh in pipes for the service of the city, gives, as the results of these separate analyses, from 9·33 to 10·01 cubic inches of gas dissolved in one imperial gallon, and the per-centage composition of these gases is, carbonic acid 8·70 to 10·71, oxygen 28·77 to 29·47, and other gases (nitrogen) 59·82 to 61·90. The proportions of oxygen and nitrogen therefore are nearly 1 to 2, and the average amount of oxygen is fully 29 per cent. The two main feeders of the Water of Leith are the Harelaw reservoir, which flows into the Bavelaw Burn, and the Water of Leith, and, as the oxygen is the principal gaseous ingredient, and the details are given in Table R., I will simply mention here, that the per-centage of oxygen in the gases dissolved in the water of the Harelaw reservoir is 29·23, whilst in the other feeder, viz., the upper part of the Water of Leith, the per-centage of oxygen is 28·87. A sample of water collected at Currie Bridge, after the discharges from various works had passed into the stream, gave 22·06 per cent. of oxygen, and another sample of water collected still further down, at Gorgie Bridge, on a different day, gave 25·20 per cent. of oxygen, whilst two samples taken at different times from the Water of Leith at Coltbridge, just before mingling with the sewage of Edinburgh, gave respectively 22·22 and 22·20 per cent. of oxygen. It is thus evident that all the discharges thrown into the river in its upper parts, from the paper mills and other public works, are sufficient only to reduce the per-centage of oxygen from 29 to 22, and there is practically enough of oxygen still left in the water to oxidise more organic matter. The actual amount of oxygen taken up by the oxidation of the organic matters discharged from the mills may, however, be relatively greater than what is represented by the proportional difference between 29 and 22, as, during its course down to Coltbridge, the Water of Leith is exposed to the air, is, moreover, at certain parts, a rapid running stream, and occasionally flows over a rocky bed, and thus the water is liable to become aërated again, and will likely, as it loses oxygen in the oxidation of the organic matter present in the water, receive a fresh supply from the atmosphere. At all events, the Water of Leith arrives at the outskirts of Edinburgh, and at the point where the first portion of the sewage is discharged into it, as a stream which still retains enough of oxygen to keep all its other ingredients in a fresh condition.

Three samples of liquid were taken from the sewer known as the Lochrin Burn, one sample from the South or Moray Place sewer at Stockbridge, and one from Canonmills sewer, and the amount of oxygen present in each of these respectively was 3·33, 2·70, 2·10, 2·80, and 2·60 per cent. In other words, the proportion of oxygen was at a minimum, and it is questionable how far the remaining traces could

have the power of oxidising organic matters. At all events it was plainly observable that the spring water which is conveyed into the houses of Edinburgh, with oxygen present in the gases dissolved therein to the extent of fully 29 per cent., is afterwards found escaping from the sewers with the proportion of oxygen less than 3 per cent. on the average of five samples. Moreover, the sewage liquids were highly charged with organic matters capable of being oxidised, and possessing the power of abstracting the oxygen dissolved in very large quantities of water.

The effect of the sewage matters on the gases disolved in the Water of Leith is very decided, for whilst the gases in the Water of Leith at Coltbridge contain fully 22 per cent. of oxygen, the sewage conveyed by the Lochrin Burn, and numerous smaller sewers discharging into the stream, has the effect of reducing the per-centage of free oxygen to 4·20 per cent. by the time the water passes down to the Water of Leith village, and much organic matter still remains dissolved and suspended in the water of the stream. The water then finds its way over a rocky bed, and, apparently, it becomes aërated anew to some extent, for under the Dean Bridge the per-centage of oxygen in the gases has increased to 5·70, and behind Moray Place, near St. Bernard's Well, to 6·10, whilst on another occasion the proportion rose to 10·20 per cent. As the stream flows on, the aëration process proceeds, counter-balanced, however, by the oxidation of the organic matters already present, and being received every here and there, the proportions of oxygen fluctuate from 6·60 to 4·10 near Stockbridge, and at St. Mark's Place, after the lade joins, from 6·98 to 4·10. The gases dissolved in the waters of the lade which traverses Edinburgh, gave at India Place, on two different occasions, 4·76 and 6·40 per cent. of oxygen, and the water of the lade, just before joining the Water of Leith at St. Mark's Place, gave 5·40 per cent. of oxygen.

These experimental data afford proof that whilst the water of the Water of Leith arrives at Coltbridge charged with oxygen, that immediately in mingling with the sewage of Edinburgh, conveyed by the Lochrin Burn, the proportion of oxygen is reduced to a minimum, and practically the Water of Leith and the lade traverse the streets of Edinburgh destitute of the power of oxidising the organic matter discharged into it by the numerous drains and sewers. The result is that true putrefaction proceeds, and noxious gaseous exhalations are evolved from the decomposing organic matters. Under no circumstances is oxygen evolved from the decomposition of animal and vegetable substances, and as there is practically no purifying agent left in the Water of Leith, the extensive deposits of organic muds, which are found here and there and everywhere in the bed of the stream and lade, have no oxygen to consume or burn them, and are left to putrefy and exhale fulsome emanations.

X. *The Atmosphere in the Neighbourhood of the Water of Leith, &c.*

The gases evolved from the decomposing matters were generally recognised in the immediate vicinity of the Water of Leith conveying the sewage, as also in close proximity to the main drains or sewers. The odour was not that of sulphuretted hydrogen, but a heavy fœtid nauseous odour, specially observable immediately over the stream, and was doubtless due to the escape of gases produced by the putrefaction of the organic deposits. The state of the atmosphere was not only judged of by the test of the nose, but special experiments were made with a standard solution of permanganate of potash, so as to determine

the relative purity or impurity of the atmosphere in the vicinity of the Water of Leith, and at some distance therefrom. The employment of the permanganate of potash for the detection of impurities in the air was first suggested by Dr. Angus Smith of Manchester. The standard solution which was used in making the analyses of the air in connection with this enquiry was of such a strength that 250 grains, by measure, of the permanganate of potash solution were decolorised by 0·027 of a grain of fruit sugar, and the same quantity of permanganate was decolorised by 0·0075 of a grain of metallic iron.

In the collection of the samples of the atmosphere at various localities, half gallon stoppered bottles were taken, and after being rinsed with sulphuric acid and nitric acid, were thoroughly washed with water, treated with a little permanganate of potash, re-washed with distilled water, and then filled with pure water and the stoppers inserted. When the bottle was intended to be filled with air a siphon was introduced to the bottom of the bottle, and the water being run off by the siphon, the air entered at the mouth of the bottle without being washed by the water. The bottle was re-stoppered and the contents were tested as quickly as possible.

In using the standard test solution of permanganate of potash for the examination of the air, an improvement in its mode of application was suggested by Dr. Penny, and carried out in these investigations. Instead of employing the coloured solution, little by little, so long as the colour was destroyed, which leads to great irregularity in the length of time of agitation, and is, moreover, tedious, a series of standard tubes were filled with solutions of the permanganate of potash of varying strength, so as to form a sliding scale, where the full or undiluted colour was No. 1, and the succeeding numbers contained more and more water till No. 11 was nothing but water. The following short table will exhibit the scale which was adopted as the test standard :

Test tube.						Degree in scale.
No. 1	contained	250	grains	of the solution of permanganate of potash, and	no water	100
„ 2	„	225	„	„	25 grs. water	90
„ 3	„	200	„	„	50 „	80
„ 4	„	175	„	„	75 „	70
„ 5	„	150	„	„	100 „	60
„ 6	„	125	„	„	125 „	50
„ 7	„	100	„	„	150 „	40
„ 8	„	75	„	„	175 „	30
„ 9	„	50	„	„	200 „	20
„ 10	„	25	„	„	225 „	10
„ 11	„	0	„	„	250 „	0

The mode of testing the air in the bottles consisted in adding 250 grains by measure of the standard solution of permanganate of potash, and agitating the test solution with the air for five minutes, when the solution was poured into a test tube, and the depth of colour still remaining observed, and contrasted with that of the solutions in the standard test tubes. If one half of the colour was lost, the liquid from the bottle would resemble in depth of tint that in test tube No. 6, which contains 125 grains of the permanganate of potash solution, along with 125 grains of water, and the degree in the scale of purity would be 50 ; absolute purity being 100, and the complete decolorisation of the liquid being 0.

31 samples of air were collected at various parts on different occasions and were tested (Table S.). On the 7th April, nine samples were tested, and whilst the degrees of purity of the air at three stations in Edinburgh away from the influence of the Water of Leith were respectively (100 being absolute purity) 85, 70, and 67, and the air at the Water of Leith at Coltbridge, before being mingled with sewage was 75, the atmosphere in the immediate vicinity of the sewers and of the Water of Leith conveying sewage had its degree of purity reduced to 63, 58, 55, and 55, and in one instance, as below the dam under the Water of Leith village, the 100 of standard colour was totally destroyed, a second 100 was similarly bleached, and of a third 100 only 20 remained. The reason of the very impure state of the air at this point lies in the fact that the water conveying the sewage, in falling over the dam, is dashed into foam, and the impure gases tend more quickly to escape, and thus contaminate the surrounding atmosphere to an extent more than in ordinary circumstances.

On the 9th April, 16 samples of air were collected and examined. Three samples taken in Edinburgh in places away from the Water of Leith, and one sample collected in Leith at a distance from the polluted stream, gave respectively the degrees of purity of 80, 75, 80, and 80, and one sample taken from the harbour at the Victoria Dock head gave 70 ; whilst the air collected under the immediate influence of the Water of Leith, conveying the sewage of Edinburgh and Leith, gave respectively 60, 60, 50, 60, 60, 55, 55, 55, 60, 50, and 55. On the 14th April six samples of air were collected and examined, when it was found that over the Water of Leith above Coltbridge, and before mixture with sewage, the degree of purity was 80, whilst over the sewers, and the Water of Leith conveying sewage, the degrees of purity were 68, 66, 70, 64, and 70 respectively.

These experimental results demonstrated that the atmosphere in the immediate neighbourhood of the Edinburgh and Leith sewers and the Water and Harbour of Leith contains more impurity than what is present in those parts of Edinburgh and Leith which are away from the influence of the foul gases emanating from the putrefying substances in the Water of Leith.

XI. *The Vegetable and Animal Life in the Water of Leith, &c.*

In the bed of the Water of Leith above the influence of sewage as at Gorgie dam, which is about a mile above Coltbridge, the stones over which the water flows have plants, such as moss, attached to them, and these plants are found on the stones in the bed of the streams conveying water practically free from putrescent matter ; but from the entrance of the Edinburgh sewage at Coltbridge downwards to the harbour of Leith, the stones in the bed of the stream are covered with offensive organic growths, which are characteristic of waters conveying sewage and capable of decomposing and evolving unwholesome gases. Indeed, not only are the stones covered with such vegetable growths, but everything in the bed of the river, such as arrested portions of trees, become thickly coated. They are also seen in the sewers called the Lochrin Burn sewer, the Broughton Burn, and the Bulls Stank sewer at Lovers Loan as it leaves Edinburgh, in all of which the bottom and sides are more or less covered with the growths. Even in the narrowed part of the channel of the Water of Leith, where the run of water is great, these organic matters are abundant, and likewise in the bottom and sides of the lade which traverses Edinburgh. All the twigs and branches of trees which hang

down into the Lochrin Burn sewer, and into the water of the lade, as from the gardens behind Ainslie Place and Moray Place, have these growths adhering in long streamers, rendered bulky and doubly foul by the accumulation of entangled filth. These growths principally consist of those low forms of vegetable life which are regarded by some naturalists as *Fungi*, and by others as *Algae*, and they are accompanied by masses of animals belonging to the family of *Vorticellidæ*, including the genera *Vorticella*, *Carchesium*, *Zoothamnium*, and *Epistylis*. Much of the organic matters which are found entangled in the branches of trees hanging into the lades and open sewers, as also of the organic deposits which are found in the beds of the Water of Leith and of the lades, are composed of the decaying remains of such growths.

The chemical analyses of these organic growths (Table T.) demonstrated, that even when examined with all the adhering entangled filth, when dried, they contained on the average of seven samples, 50·61 per cent. of organic matter, of which 0·84 consisted of nitrogen. These organic matters are being constantly detached from the stones, &c., on which they grow, and the torn off fragments float down the stream or lade and form part of some deposit in a rocky pool or in the still water above a dam. A considerable proportion of the deposits observed in the bed of the Water of Leith behind Ainslie Place and Moray Place and in the large cesspool at St. Mark's Place, consisted of those organic growths passing into an active state of putrescence. During the spring months the growths are apparently stronger and form longer streamers than during the summer months. The temperature of the latter is higher and facilitates changes such as the disintegration of the mass. These growths appear to be the last stage of organic life which will inhabit foul water, but in places where in the spring many patches of the growth were observed, in summer hardly any was to be noticed. This disappearance, in part at least, of the growth is to be attributed to the more foul state of the sewers and Water of Leith in summer, which leads in some places to such a rapid putrefaction as even to arrest the development of this comparatively simple form of organic life.

In the whole course of the Water of Leith from Coltbridge downwards not a single fish could be seen. The animal life which were specially visible to the naked eye consisted of colonies of small red worms, which were very abundant in many places, and are regarded as the last remnant of animal life which will exist in water contaminated by sewage. These minute red worms are a kind of *Nais*, belonging to the family of *Naidina*, and are named *Tubifex rivulorum*. They are found in greater abundance in the Water of Leith during spring than in summer, apparently from the more active putrescence of the sedimentary matter leading in the summer to the disengagement of a more full supply of noxious gases which even these minute worms cannot survive. In many places, where in spring the bed of the stream or of the lade harboured myriads of even this inferior type of animal life, there was hardly a specimen to be had, and this was doubtless due to the more rapid putrescence of the deposits. Abundance of animalculæ, including the *Paramaecia*, were found in the Water of Leith at all seasons of the year.

One curious effect of sewage upon animal life was observed by me in the harbour of Leith. Two wooden piers stretch some distance into the sea ; they are constructed of the same kind of timber and are of the same age. The West pier is not liable to be influenced by sewage passing down the harbour as the tide sweeps the sewage from it, and

the wood of this pier is nearly eaten through in some parts by the *Teredo*, a bivalve (Lamellibranchiate) mollusc, which is well known to be destructive to wooden erections in the sea. But the East pier is washed by the sewage water, and apparently from the disengagement of sulphuretted hydrogen, which is specially formed when sewage meets sea water, there is not a single *Teredo* to be seen at its work of drilling holes in the wood. The sewage in such circumstances therefore appears to be beneficial in retarding the ravages of this troublesome mollusc.

Independently of the putrefaction of the sedimentary deposits fish might live in water which contained nearly the proper proportion of oxygen, but the water of the Water of Leith from Coltbridge downwards is almost devoid of oxygen, and fish can no more live in water containing no oxygen than land animals could live in an apartment destitute of air.

It it worthy of note, as evidence of the state of the water of Leith and its incapacity to support the life of fish, that during the summer of 1864 a shoal of young herrings attempted to enter the harbour of Leith, and those herrings turned over on account of the foulness of the water and the majority died upon the spot.

XII. *The Purification of the Water of Leith.*

The foul and abominable condition of the Water of Leith when polluted by the sewage of about 100,000 of the inhabitants of Edinburgh and Leith, and the consequent danger to health of the communities of both towns who inhabit houses in the vicinity of the stream, led to strenuous efforts being made to remove the cause of the evil and provide for the purification of the water of Leith, which at the present time is practically an open sewer, by the interception of the sewage and its conveyance by a main drain to the sea. The scheme which was suggested and approved of by both corporations, and which, having received the sanction of Parliament, is now in course of being carried out, provides for a main drain from Coltbridge down to Leith, and then out to sea to the Black Rocks. The whole length of the pipe and culvert will be about $5\frac{1}{4}$ miles for the main work, and 2 miles for branches, and the gradients will be from 1 in 40 to 1 in 600: the latter being the gradient at the outlet. The length of main pipe and branches in the Edinburgh district is from 4 to 5 miles, and the estimated cost of that part of the work, viz., from Coltbridge down to the boundary of Edinburgh and Leith is 29,314*l.*; whilst the length of the main pipe and branches from the boundary of Edinburgh and Leith at Bonnington to the Black Rocks at sea is 9,600 feet, and the estimated cost of that part of the work is 25,686*l.* The whole estimated expense of the work is 55,000*l.* which is a small sum in comparison with the 5,000,000*l*, now being expended by London in a similar measure, and the cost of the works is to be defrayed by a rate limited to 2*s.* 6*d.* per pound rental for one year, on all the property, within the parliamentary boundaries of Edinburgh and Leith, draining into the water of Leith, and contributing to the sewage, with the addition of a grant of 4,000*l.* from the Leith Docks Commission.

The main drain is to be an iron pipe throughout the greater part of its length, though at a portion of its course it will be a brick culvert. At the Lochrin Burn sewer and the Broughton Burn sewer there will be cesspools for the arrestment of dead cats and dogs and other materials thrown into these sewers where they run as open ditches, but all the other drains and sewers will be directly connected with the main drain,

leaving overflow pipes for the discharge of the comparatively pure water of high floods. The main drain will intercept all the ordinary sewage of Edinburgh and Leith, which naturally drains into the water of Leith and the lades. The apertures of the different branches and connections with the sewers will be considerably larger than the size required for the present flow of sewage, so that a reasonable fall of rain will also be received in the main drain.

The diameter of the entrance to the main drain or iron pipe at its commencement at Coltbridge and where the Lochrin Burn sewer enters will be 18 inches, and it will convey away 360 cubic feet of sewage per minute ; at Stockbridge, where the large North and South (Moray Place) sewers enter, the iron pipe will be 30 inches in diameter and be capable of carrying 1,616 cubic feet of sewage per minute. At Canonmills, where another large Edinburgh sewer joins, the diameter of the main drain will be increased to 33 inches. At the boundary of Edinburgh and Leith, at Bonnington, the drain will be a brick culvert 4 feet 6 inches by 3 feet ; and at Leith, and passing out to sea at the Black Rocks, the iron pipe of the main drain will be 3 feet 6 inches in diameter, and be capable of discharging at low water 2,200 cubic feet of sewage per minute. As the pipe is carried past the south-east side of the harbour of Leith it will have five or six overflow pipes at the level of high water, so that should there be a flood in the pipes, and very high tides at the same time, there will be a certain overflow into the harbour ; but this will only occur in exceptional cases, and then only into the harbour during high water, and when there is abundance of water to dilute the sewage and carry it off during the receding of the tidal water. The main drain only intercepts the sewage of South Leith, but simultaneously with this measure being carried out, the Corporation of Leith is bound to intercept the sewage of North Leith and carry it by an independent pipe to the sea.

The maximum amount of ordinary sewage from Edinburgh and Leith, which is discharged into the Water of Leith and will be received in the main drain, is 574 cubic feet per minute ; but this amount will be increased in the course of time by building operations, and the increase in the number of dwelling-houses and possibly of manufactories. The main pipe will certainly carry double the amount of the sewage water, and at ordinary times it may carry three times and even four times the amount of sewage water. During a flood of rain-water, the first portions of the rain will serve, from the extra force of the run, to clean out the sewers into the main drainage pipe, and when all the sediment in the sewers has been swept into the pipe, and the rain-water increases till the sewers convey more than four times their ordinary discharge, then, whilst much will still be carried away by the main drain, all the excess which will be in the upper part, and will merely, at the worst, be sewage mingled with three or four times its own volume of rain-water, will be discharged into the Water of Leith. Not only will the sewage be largely diluted when it flows from the drain into the stream, but the river itself will generally be in flood at those times, and the sewage will thus pass into the Water of Leith so much diluted with water that it will be comparatively innocuous, and will be immediately swept onwards with the flood-water.

That a flood of rain in the sewers is generally accompanied by a flood of water in the river has been placed beyond doubt by the accurate observations and measurements made by the Engineers of

the Drainage Bill, and the following Table gives the results of the simultaneous gaugings of the river and of the Lochrin Burn sewer :—

—		*Water of Leith.* Water going over the waste wiers at the dams, and over and above the 1,600 cubic feet per minute passing down the lades. Surplus water at dams in cubic feet, per minute.	*Lochrin Burn Sewer.* As it discharges into the Water of Leith at Coltbridge. Flow of water in cubic ft., per minute.
15 March 1864	-	13,850	309
16 ,,	-	8,250	237
17 ,,	-	8,255	221
18 ,,	-	4,900	194
19 ,,	-	3,950	194
21 ,,	-	2,355	203
22 ,,	-	3,300	213
23 ,,	-	1,530	178

During the winter season water is always going to waste over the wiers, but in summer weather the flow of any water over the dams is exceptional.

The average rain-fall in Edinburgh is 24 inches annually, and judging from the observations of several years it is found that a rain-fall of ·64 in. per day, which is required to produce a flow of one cubic foot a minute per acre into the sewers, and would consequently increase the usual flow of water twofold, can only be exceeded ten times in the course of a year ; so that if the main-drainage pipe has the capacity to convey double the quantity of the ordinary sewage, the pipe will only refuse to take in the whole contents of the sewers in 10 days of every year. If the main drain can carry triple the amount of the ordinary sewage, the quantity of rain required to produce more than this quantity occurs so seldom that the junction pipes will only overflow $1\frac{1}{2}$ days in the year ; and if the main drain can carry four times the quantity of the ordinary sewage, then it will only permit of the discharge of part of the flood water into the Water of Leith in seven days in every eleven years.

XIII. *The Condition of the Water of Leith as contrasted with the State of the Thames.*

In drawing this paper to a conclusion it may be interesting and instructive to contrast the present state of the Water of Leith with the condition of the Thames, and then to sum up the principal results of the investigations undertaken by me in connection with the contamination of the Water of Leith by the sewage of Edinburgh and Leith.

The condition of the Thames, as it courses through London, is much less foul than the Water of Leith as it traverses Edinburgh. The experiments made by Graham, Miller, and Hofmann show there is very little increase in the amount of organic matter in the Thames at London than there is at Thames Ditton, which is above the tidal influence, and therefore not liable to be contaminated by the sewage of London. The proportion of organic matter in the water at Thames Ditton is 2·29 grains per gallon, and in the water supplied by the Lambeth Company and derived from the Thames, London, the organic matter is only 2·59 grains per gallon. Practically, therefore, the Thames water does not materially increase in the proportion of organic matter as it flows down to London, and this statement will be more decidedly borne out by the experimental results obtained by Hofmann and Witt

on the water of the Thames from Kew Bridge down to the Victoria Dock. The following Table gives the experimental results :—

—	Solid constituents in grains per gallon.		
	Organic.	Mineral.	Total.
Water at Kew Bridge - -	1·844	23·067	24·911
„ at Crab Tree Slip, near Fulham -	1·992	20·124	22·116
„ opposite lock at Wandsworth -	2·359	23·672	26·031
„ at Westminster Bridge - -	1·937	23·496	25·433
„ at London Bridge - -	2·194	23·676	25·870
„ at Victoria Dock - -	2·032	25·649	27·681
Mean - -	2·059	23·281	25·340

The mean proportion of organic matter in the Thames water, therefore, is only two grains, which in one imperial gallon is only about $\frac{1}{35000}$th of the weight of the water, and there is hardly any increase from Kew down to London Bridge. This extraordinary result is to be fairly attributed in part at least to the quantity of oxygen in the water, which acts readily on the organic matter and consumes it. The tide appears to have some effect upon the proportion of organic matter as well as saline matter in the Thames, doubtless due to the forcing back of the sewage water, and the disturbance of the sediment in the bed of the Thames. Thus Letheby found that at Woolwich at high tide the proportion of saline matter in the imperial gallon was 453·6 grains and at low tide was 60·6 grains, and at London Bridge the saline matter at high tide was 26·5 grains and at low tide 24·9 grains ; whilst the organic matter in the water at London Bridge, at high and low water, was respectively 3 grains and 2·7 grains : of the latter 1·6 grains were in solution and 1·1 in supension. The sea, therefore, penetrates to London Bridge. Odling, in experiments made on the Thames water at Greenwich, found that on the average of many experiments, the amount of matter dissolved in the water at high tide was 191·23 grains, of which 16·28 grains were organic matter, and at low tide the proportion of matter was 45·91 grains, of which 6·13 grains were organic. It would thus appear that the average amount of organic matter in the Thames at Greenwich is nearly three times more at high water (16·28 grains) than at low water (6·13 grains). Experiments made by Odling at Greenwich at neap tide showed that at high water the matter carried by the water was 58·87 grains, of which 4·69 grains were organic matter, and at low water 27·87 grains, of which 2·64 grains were organic matter.

The mean proportion of organic matter dissolved and suspended in the Water of Leith, after receiving the successive quantities of the sewage of Edinburgh, and as the stream flows past the city and onwards to the harbour of Leith, is much greater than what is found in the water of the Thames. Indeed, as the Water of Leith at certain parts of its course, in summer or dry weather, only conveys the discharges of the common sewers, it follows that the water in the bed of the stream is almost pure sewage. During the winter and spring months, however, the whole of the natural water of the stream is not diverted into the lades, and at those times, the sewage is mingled with more or less ordinary water flowing down the bed of the river.

The *average* proportions of organic, saline, and earthy matters dissolved and suspended in the drainage liquids from Edinburgh and Leith, and which are discharged into the Water of Leith, may be observed from Table U., whilst the amount of organic matter in the imperial gallon of the liquids conveyed by the principal sewers may be more clearly observed from the following table :—

Number of Samples.	Place of Collection.	Mean Proportion of organic matter dissolved and suspended in one imperial gallon.
18	Lochrin Burn Sewer, west of Abattoir or Slaughter-houses	45·42 grs. equal to $\frac{1}{1650}$th of weight of water.
15	Lochrin Burn Sewer, above Caledonian Distillery -	44·38 „ $\frac{1}{1600}$th „
20	Lochrin Burn Sewer, above Coltbridge - - -	60·54 „ $\frac{1}{1150}$th „
10	North Sewer, at Stockbridge -	21·56 „ $\frac{1}{3200}$th „
12	South (Moray Place) Sewer, at Stockbridge - -	31·79 „ $\frac{1}{2150}$th „
21	Canonmills Sewer - -	23·70 „ $\frac{1}{2900}$th „
11	Broughton Burn Sewer - - ; Bulls Stank Sewer - ; Coal Hill Sewer - ; Drawbridge Sewer - — Discharging near and at Leith.	57·58 „ $\frac{1}{1200}$th „

When the contents of the above sewers are discharged into the Water of Leith they necessarily raise the relative amount of organic, saline, and earthy matters in the water of the stream, as may be specially observed from Table V., which gives the *average* proportions of such substances dissolved and suspended in the Water of Leith, from immediately above Coltbridge, where the sewage begins to enter, down to the Harbour of Leith ; and the following table gives the various quantities of the organic matter dissolved and suspended in the Water of Leith at the principal stations, from its sources down to the sea.

Number of Samples.	Place of Collection.	Mean Proportion of organic matter dissolved and suspended in one imperial gallon.
1	Water of Leith above Balerno Bridge (source) - -	2·00 grs. equal to $\frac{1}{35000}$th of weight of water.
1	Water of Leith, Harelaw Reservoir (source) - - -	2·56 „ $\frac{1}{28000}$th „
23	Water of Leith, above Coltbridge, after receiving discharges from Works and before being mingled with the Sewage of Edinburgh and Leith - - -	5·07 „ $\frac{1}{14000}$th „
	Water of Leith, from Coltbridge downwards, and whilst receiving successive quantities of Sewage.	
1	Water of Leith, down to Water of Leith Village - -	9·72 „ $\frac{1}{7000}$th „

Number of Samples.	Place of Collection.	Mean proportion of organic matter dissolved and suspended in one imperial gallon.			
6	Water of Leith, under Dean Bridge - - -	10·15	„	$\frac{1}{7000}$th	„
6	Water of Leith, behind Moray Place - - - -	9·61	„	$\frac{1}{7000}$th	„
6	Water of Leith, above Stockbridge - - -	9·91	„	$\frac{1}{7000}$th	„
9	Water of Leith, below Stockbridge - - - -	23·16	„	$\frac{1}{3000}$th	„
1	Water of Leith, at Warriston Crescent - - -	17·72	„	$\frac{1}{3900}$th	„
8	Water of Leith, from lade behind India Place, and at Beaver Hall - - -	10·82	„	$\frac{1}{6500}$th	„
18	Water of Leith, St. Mark's Place - - - -	26·45	„	$\frac{1}{2600}$th	„

It will thus be observed that the Water of Leith, as it leaves Edinburgh, contains fully ten times the quantity of organic matter which is found in the Thames at London Bridge, and necessarily the offensiveness of the water must be correspondingly greater.

The solid matter discharged by the sewage of London in one day is calculated to amount to 250 tons, and as 50 days elapse before it is capable of reaching Gravesend, it must by that time have mingled with 250 millions of tons of water, and the oxygen contained therein is no doubt sufficient to aid in the decay or combustion of the organic matter, and thus consume it, without putrefaction (in the true sense of the term) setting in. Indeed, before it reaches Gravesend, the greater part of the organic matter must be decomposed, and even at the worst, the water can only have present 12,500 tons distributed amongst 250,000,000 tons of water, which is only 2 ozs. of solid matter in a ton of the water, or $\frac{1}{20000}$th part of the weight of the water. In the investigations relating to the sewage of London and its effects on the Thames, and the injury to health inflicted thereby, it is conclusively shown that the greatest part of the nuisance lies in the sedimentary matter which lines the banks and is in an active state of putrefaction ; and the same conclusion has been come to by me in regard to the foul deposits in the bottom of the lades and in the bed of the water and harbour of Leith. The *average* composition of these sedimentary matters collected from the bottom of the open sewers discharging into the Water of Leith, and from the bed of the Water of Leith, of the lades, and of the harbour, is given in Table W. in a condensed form.

The mixture of sea water with the sewage in the harbour of Leith causes, besides the ordinary putrefaction, the production of sulphuretted hydrogen in quantity, and this was specially observable in the mud which was brought up from mid-channel of the harbour by a dredging machine during one of my visits to the Water of Leith. A similar disengagement of sulphuretted hydrogen under like circumstances has been observed previously, especially where organic matter meets with sea water in hot climates, such as on the coasts of Africa, and it has also been observed in part to occur in the Thames, and give rise at least to an increase in the amount of sulphuric acid in combination with Thames water at high tide as

compared with low tide. The disengagement of sulphuretted hydrogen in tropical regions when organic matter and sea water meet is so decided that the odour and other effects of sulphuretted hydrogen have sometimes been observed 27 miles at sea from the mouths of rivers.

The gases evolved during the decomposition of the sedimentary matters lying in the open sewers, the lades, and in the bed of the Water of Leith do not, however, contain much sulphuretted hydrogen (hydrosulphuric acid), but mainly consist of carburetted hydrogen and other combustible gases and vapours which are known to be evolved during the putrefaction of organic matters. The *average* composition of twelve samples of these gases, collected from five stations, is given in Table X.

The gases dissolved in the waters of the sewers, the lades, and the Water of Leith are equally characterized by the minute proportion of sulphuretted hydrogen which is present at any time in these waters, and the amount of which is so slight, that, in many instances, it cannot be recognised. The *average* composition of twenty-five samples, collected from six stations, is given in Table Y. The gases evolved from the decomposing and putrefying deposits rise up through the water which flows above, and pass into the atmosphere, and the liquids also tend to interchange their foul gases with the gaseous constituents of the air, and hence the neighbouring atmosphere becomes contaminated by the evolution of those fœtid gases. The *average* relative purity of thirty samples of the atmosphere collected in districts away from and near the open sewers, lades, and the Water of Leith is given in Table Z.

XIV. *General Conclusions.*

In considering the whole subject of this paper, and contrasting the results of the investigation made by me relative to the Water of Leith with those made in London on the Thames, and knowing the great benefits derivable from improved drainage in the lessening of the rate of sickness and of death in all localities where effective and judicious sanitary measures have been carried out, I beg to submit the following conclusions on the contamination of the Water of Leith by the sewage of Edinburgh and Leith :—

I. That the Water of Leith, above the influence of the sewage of Edinburgh, is a small stream of water of a peaty or mossy nature, which has its original amount of organic and saline matters increased by discharges from paper mills and other public works, but arrives at Edinburgh in a condition not liable to putrefaction and containing a good proportion of free oxygen gas.

II. That the Water of Leith, immediately above Coltbridge, and before admixture with the Edinburgh sewage, is comparatively free from foul deposits and from unsightly organic growths, and does not evolve unwholesome gases into the surrounding atmosphere, and thus contaminate the air of the vicinity.

III. That the Lochrin Burn and other sewers and drains of Edinburgh convey large quantities of offensive liquids with decomposing organic matter in solution and mechanical suspension, and discharge such into the Water of Leith at many points from Coltbridge downwards.

IV. That the organic matters so conveyed into the Water of Leith principally consist of the decomposing effete matters of the

animal system, including the solid excrements or fæces, and even in comparatively cold weather evolve abundantly offensive odours.

V. That the sides and bottom of the open sewers, of the lades which traverse Edinburgh, and the bed of the Water of Leith from Coltbridge downwards, are more or less covered with offensive organic growths characteristic of streams and open drains which convey sewage matters.

VI. That the bottom of the open sewers, the bottom of the Edinburgh lades, the bed of the Water of Leith from Coltbridge downwards, and the harbour of Leith, are more or less thickly covered with organic matter in an advanced stage of putrefaction, which fills up the rocky pools at certain parts and renders the dams vast open cesspools.

VII. That the signs of animal life visible to the naked eye in the Water of Leith, after commencing to receive the sewage of Edinburgh, consist mainly of multitudes of minute worms, which are characteristic of waters conveying sewage, and may be regarded as the last remnant of animal life which will survive in such a locality, and even these die off in many places during the summer weather, and when the putrescence of the organic matter proceeds more rapidly.

VIII. That the organic sedimentary matters which are deposited in the bed of the Water of Leith from Coltbridge downwards, in the harbour of Leith, and in the various lades below Coltbridge, are in a state of active putrefactive fermentation, and the slightest agitation of the deposit gives rise to the abundant evolution into the surrounding atmosphere of those gases which are well known to be evolved from decomposing vegetable and animal matters.

IX. That whilst all healthy water contains a considerable proportion of oxygen gas dissolved therein, which can act in consuming any organic impurities which may pass thereinto, the Water of Leith, after mixing with the sewage matters, is found to be practically devoid of oxygen gas, and the contents of the sewers are found equally devoid of oxygen gas, so the waters of the sewers and of the Water of Leith from Coltbridge downwards are practically devoid of any purifier, and must allow their contents to become putrescent.

X. That the putrescence of the organic liquids and deposits in the open sewers, the bottom of the lades, and the bed of the Water of Leith, in all weathers, but especially in summer, and the evolution of noxious gases therefrom, lead to the sensible contamination of the surrounding atmosphere, and consequently decrease the purity and healthiness of the air.

XI. That, taking all these circumstances into consideration, I am decidedly of opinion that the discharge of sewage-matters into the Water of Leith in any weather, but especially in the warmer months, leads to the accumulation of organic matter of a most offensive nature, and that the consequent putrefaction of this organic matter gives rise to the evolution of gases which are highly offensive and pernicious, and must render the neighbouring localities more or less unwholesome.

XII. That the condition of the Water and Harbour of Leith is much more noxious than any part of the Thames, as the proportion of organic matter is much greater, and the rocky pools and dams afford more obstacles to the flow of the sewage, and that the time had certainly arrived when a main-drainage scheme was absolutely required for the purification of the Water of Leith.

The lengthened investigation into the condition of the Water of Leith, and the contamination of the stream with the sewage of Edinburgh and Leith, has brought prominently before me the great injury done to rivers by the sewage of populous places. The full effect of such contamination cannot be observed by the simple inspection or even the analysis of the water, so as to determine merely the proportion of organic matter which may be present therein, but can only be learned by a thorough examination of:—

1. The liquids conveyed by the sewers and rivers :
2. The sedimentary matters lying in the bottom of the open sewers and the bed of the rivers :
3. The gases evolved during the decomposition of these sedimentary matters :
4. The gases dissolved in the waters ; and
5. The atmosphere in the neighbourhood of the open sewers and rivers conveying sewage.

The injury done by sewage in the contamination of the waters of streams and rivers is not the only grievance which is sustained by the improper discharge of the drainage of houses. In the smaller towns and villages where no drainage system is carried out, and where no regular water supply is introduced, a plan of receiving water and discharging drainage is adopted which is positively unwholsome and detrimental.

In the better class of dwellings in non-drainage localities, each house, when built, is provided immediately underneath or in a small front or back plot, with two holes, one of which is a well with a pipe leading to the house and the second is a cesspool with a pipe coming from the house, so that the water is drawn from the one hole and is returned to the other. The well is in most instances dependent for its supply on the percolation of water from the sides and bottom, and thus it draws water from the neighbouring ground ; whilst the cesspool of the house is not many yards away, and the liquid discharged from the water-closets and kitchen sinks, is run into the cesspool, oozes through the soil and enters the well. That cesspools are related to wells in this manner is abundantly evident from the examination of the ground, and the analysis of the water from the well. The ground around the cesspool is more or less impregnated with organic matter, and whilst the more solid parts of the impurities are left in the ground, the more liquid portions enter the well. Occasionally the sides of the well are stained with an offensive slime, and in many instances, when the wells are cleared out, they are found to contain a large quantity of decomposing organic sediment. The sewage when discharged from a house in a fresh state is comparatively harmless ; but when putrefaction sets in, and especially if the matter is arrested in cesspools in the immediate neighbouring ground, there is much danger from the contamination of the wells, and the escape of noxious gases into the surrounding atmosphere. During the process of putrefaction, a portion of the offensive matters become liquid and are dissolved in the water, and whilst, in some instances, the organic matter permeates the

soil and communicates a greenish yellow colour, and an offensive odour and taste to the water; yet in most cases the water does not betray from its colour, odour, or taste, the slightest evidence of being contaminated by the products of offensive animal and vegetable matters which have undergone putrefaction and decay. For some years my attention has been specially directed to the influence of cesspools and other accumulations of organic matter on waters intended to be employed for household use, and I have repeatedly examined waters of pleasing appearance which were regularly used for drinking and for culinary purposes, and were even famed as first class waters for general dietetic use, and which, on chemical examination, proved themselves to contain in one imperial gallon from two to thirty grains of organic matter and the products derived from its decomposition.

The results of the many experiments and observations which I have made on the pollution of the Water of Leith and other streams and rivers, as also on the contamination of wells, by the sewage of houses and towns, have demonstrated the following general conclusions on the important question of the influence of drainage materials on natural waters :—

I. That the discharge of the sewage of towns and cities into streams and rivers pollutes the water by the admixture of much organic matter in a state of active putrescence.

II. That the more solid part of the sewage discharged by drains into streams and rivers, accumulates in all pools, and above all dams, cauls, or other obstructions, and forms a deposit of decomposing filth.

III. That the organic matter conveyed by the sewers into natural waters, is more or less acted upon by the oxygen dissolved in the water, and is in part consumed thereby.

IV. That the combustion of part of the organic matter necessitates that the oxygen gas dissolved in the water, and which is the natural purifier, should be abstracted therefrom, and subsequently the remainder of the organic matter must pass into a state of putrefaction.

V. That the sedimentary matter which is conveyed by sewage, and which lodges in the pools and above obstructions, as well as on the banks of the streams and rivers, is of a nature to be actively putrescent.

VI. That the organic matter dissolved in the water, and the organic deposits, are constantly evolving considerable volumes of gases which mainly consist of combustible gases, or those which are known to be given off during the putrefaction and decomposition of animal and vegetable matters.

VII. That the gases evolved during the putrefaction of the organic substances contaminate the atmosphere of the neighbourhood, and necessarily decrease the healthy nature of the air.

VIII. That when the proportion of sewage is comparatively little, the waters of streams and rivers may contain enough of oxygen to consume much of the organic matter, but this necessitates that the proportion of oxygen be diminished, and the water be rendered more or less irrespirable for fish.

IX. That natural waters conveying relatively a large proportion of sewage matter are totally unfit for the sustenance of the life of fish, as the oxygen, for their respiration, has been

abstracted, and the water has become practically devoid of that gas.

X. That, in districts where defective or no drainage is carried out the well waters are liable to be contaminated by the decomposing organic matter which is discharged into the neighbouring cesspools, and impurities derived therefrom may be present in well waters which are devoid of colour and odour, have no unpleasant taste and may be popularly known as good waters.

XI. That water contaminated by sewage becomes more or less unfit for household purposes, and even when the proportion of sewage is small, and the water may be comparatively clear, it is unwholesome as a beverage, and is unfit for culinary purposes.

XII. That it behoves all parliamentary and municipal authorities to pass and enforce measures for the suppression of the causes of the pollution of wells, streams, and rivers, and thus arrest the evils which are necessarily attendant on the contamination of streams, rivers, and other waters by the sewage of cities, towns, villages, and other populous places.

(Signed) STEVENSON MACADAM.

Table A.

Liquids collected from the Drains and Sewers discharging into the Water of Leith.

Temperature. Air.	Temperature. Liquid.	Place and Time of Collection.	In solution. Organic matter in grains.	In solution. Saline matter in grains.	In solution. Total matter in solution in grains.	In suspension. Organic matter in grains.	In suspension. Earthy matter in grains.	In suspension. Total matter in suspension in grains.	One imperial gallon contains in solution and suspension. Organic matter in grains.	One imperial gallon contains in solution and suspension. Saline and earthy matter in grains.	One imperial gallon contains in solution and suspension. Grand total matter in grains.
		Loehrin Burn, West of Abattoir or Slaughter-houses.									
Fahr.	Fahr.	Day. Hour.									
46°	48°	14th March 1864 at 2.16 p.m.									
52°	45°	17th „ „ 1.45 p.m.									
51°	45°	18th „ „ 11.35 a.m.	11·68	31·20	42·88	28·80	52·00	80·80	40·48	83·20	123·68
50°	44°	19th „ „ 10.32 a.m.									
50°	45°	21st „ „ 4.7 p.m.									
48°	45°	22d „ „ 3.8 p.m.									
47°	46°	23d „ „ 12.25 p.m.	16·00	24·00	40·00	19·68	13·12	32·80	35·68	37·12	72·80
47°	45°	24th „ „ 9.40 a.m.	18·60	16·56	35·16	13·88	10·12	24·00	32·48	26·68	59·16
44°	45°	26th „ „ 10.46 a.m.	8·80	24·48	33·28	28·96	8·32	37·28	37·76	32·80	70·56
44°	44°	28th „ „ 5.2 p.m.	5·60	22·56	28·16	12·48	6·40	18·88	18·08	28·96	47·04
45°	44°	29th „ „ 2.10 p.m.	17·28	27·20	44·48	16·80	16·00	32·80	34·08	43·20	77·28
44°	43°	30th „ „ 7.20 a.m.	6·24	19·20	25·44	16·60	5·28	21·88	22·84	24·48	47·32
49°	47°	31st „ „ 1.5 p.m.	10·88	25·60	36·48	14·08	9·12	23·20	24·96	34·72	59·68
48°	46°	1st April 1864 „ 1.55 p.m.	7·20	25·92	33·12	24·48	18·72	43·20	31·68	44·64	76·32
44°	44°	2d „ „ 9.45 a.m.	6·72	18·24	24·96	22·88	8·32	31·20	29·60	26·56	56·16
56°	48°	7th „ „ 9.10 a.m.	21·12	35·20	56·32	89·44	10·72	100·16	110·56	45·92	156·48
69°	57°	20th May 1864 „ 12.20 p.m.	18·40	24·00	42·40	135·36	15·04	150·40	153·76	39·04	192·80
64°	54°	25th „ „ 10.25 a.m.	15·60	28·88	44·48	27·68	10·72	38·40	43·28	39·60	82·88
		Average of 18 samples -	12·36	26·61	38·97	33·06	24·66	57·72	45·42	51·27	96·69

Table B.

Liquids collected from the Drains and Sewers discharging into the Water of Leith.

Temperature. Air.	Temperature. Liquid.	Place and Time of Collection.	In solution. Organic matter in grains.	In solution. Saline matter in grains.	In solution. Total matter in solution in grains.	In suspension. Organic matter in grains.	In suspension. Earthy matter in grains.	In suspension. Total matter in suspension in grains.	One imperial gallon contains in solution and suspension. Organic matter in grains.	One imperial gallon contains in solution and suspension. Saline and earthy matter in grains.	One imperial gallon contains in solution and suspension. Grand total matter in grains.
		Loehrin Burn above Caledonian Railway.									
Fahr.	Fahr.	Day. Hour.									
46°	43°	14th March 1864 at 1.56 p.m.									
47°	50°	17th „ „ 2 p.m.									
47°	53°	18th „ „ 11.52 a.m.									
50°	52°	19th „ „ 10.50 a.m.	16·08	31·60	47·68	32·96	9·12	42·08	49·04	40·72	89·76
47°	53°	21st „ „ 4.30 p.m.									
48°	52°	22d „ „ 3.30 p.m.									
47°	53°	23d „ „ 12.48 p.m.	30·68	26·24	56·92	98·48	10·40	108·88	129·16	36·64	165·80
56°	57°	27th April 1864 „ 9.25 a.m.	12·00	24·00	36·00	45·16	11·72	56·88	57·16	35·72	92·88
64°	65°	20th May 1864 „ 12.40 p.m.	18·80	22·88	41·68	18·08	9·12	27·20	36·88	32·00	68·88
54°	61°	26th „ „ 9.25 p.m.	18·80	24·32	43·12	16·88	6·64	23·52	35·68	30·96	66·64
53°	57°	27th „ „ 12.20 a.m.	13·20	23·20	36·40	12·40	4·80	17·20	25·60	28·00	53·60
52°	56°	27th „ „ 2.30 a.m.	10·84	18·40	29·24	8·20	3·80	12·00	19·04	22·20	41·24
51°	55°	27th „ „ 4.30 a.m.	8·20	16·32	24·52	5·88	2·72	8·60	14·08	19·04	33·12
60°	59°	27th „ 12.25 p.m.	14·16	29·84	44·00	12·72	6·80	19·52	26·88	36·64	63·52
63°	58°	28th „ „ 1 p.m.	13·36	25·76	39·12	13·68	6·12	19·80	27·04	31·88	58·92
		Average of 15 samples -	15·77	26·70	42·47	28·61	7·79	36·40	41·38	34·49	78·87
			Dreg running from Caledonian Distillery.								
46°	51°	14th March 1864 at 2.1 p.m.	78·40	25·60	104·00	19·68	2·72	22·40	98·08	28·32	126·40
54°	187°	5th April 1864 „ 2.25 p.m.	880·64	193·60	1074·24	242·88	13·92	256·80	1123·52	207·52	1331·04
		Average of 2 samples of dreg	479·52	109·60	589·12	131·28	8·32	139·60	610·80	117·92	728·72
47°	199°	21st March 1864 at 4.35 p.m.	Dreg allowed to settle and sediment dried at 212° yielded - - - -						Organic. 93·32	Saline. 6·68	Total per ct. 100·00

TABLE C.

Liquids collected from the Drains and Sewers discharging into the Water of Leith.

Temperature.		Place and Time of Collection.	In solution.			In suspension.			One imperial gallon contains in solution and suspension.		
Air.	Liquid.		Organic matter in grains.	Saline matter in grains.	Total matter in solution in grains.	Organic matter in grains.	Earthy matter in grains.	Total matter in suspension in grains.	Organic matter in grains.	Saline and earthy matter in grains.	Grand total matter in grains.
		Lochrin Burn above Coltbridge.									
Fahr.	Fahr.	Day. Hour.									
45°	44°	14th March 1864 at 1.38 p.m.									
48°	48°	17th „ „ 2.23 p.m.									
48°	47°	18th „ „ 12.10 a.m.									
50°	44°	19th „ „ 11.10 a.m.	23·04	27·20	50·24	39·68	16·32	56·00	62·72	43·52	106·24
47°	45°	21st „ „ 4.50 p.m.									
48°	43°	22d „ „ 3.50 p.m.									
50°	51°	23d „ „ 1.25 p.m.	11·52	23·04	34·56	17·92	8·00	25·92	29·44	31·04	60·48
44°	47°	28th „ „ 5.20 p.m.	16·24	31·20	47·44	93·68	7·52	101·20	109·92	38·72	148·64
44°	60°	30th „ „ 7.50 a.m.	174·88	40·64	215·52	15·04	4·00	19·04	189·92	44·64	234·56
48°	54°	1st April 1864 „ 2.15 p.m.	33·92	27·04	60·96	27·52	9·12	36·64	61·44	36·16	97·60
44°	48°	2d „ „ 10.5 a.m.	13·68	21·92	35·60	12·72	8·00	20·72	26·40	29·92	56·32
56°	54°	7th „ „ 9.35 a.m.	11·52	24·80	36·32	79·84	4·32	84·16	91·36	29·12	120·48
64°	63°	20th May 1864 „ 1 p.m.	16·40	25·44	41·84	8·32	8·32	16·64	24·72	33·76	58·48
54°	57°	26th „ „ 9.35 p.m.	12·16	25·60	37·76	4·00	6·80	10·80	16·16	32·40	48·56
53°	57°	27th „ „ 12.35 a.m.	11·36	27·20	38·56	3·56	3·64	7·20	14·92	30·84	45·76
52°	60°	27th „ „ 2.45 a.m.	8·60	19·20	27·80	4·12	3·48	7·60	12·72	22·68	35·40
51°	56°	27th „ „ 4.40 a.m.	22·40	19·20	41·60	3·60	4·16	7·76	26·00	23·36	49·36
62°	59°	27th „ „ 1.15 p.m.	12·40	23·04	35·44	6·92	6·16	13·08	19·32	29·20	48·52
63°	59°	28th „ „ 1.10 p.m.	12·36	20·64	33·00	8·44	6·16	14.60	20·80	26·80	47·60
47°	68°	30th „ „ 7.10 p.m.	130·56	38·40	168·96	60·80	5·92	66·72	191·36	44·32	235·68
		Average of 20 samples -	31·31	26·53	57·84	29·23	9·17	38·40	60·54	35·70	96·24

TABLE D.

Liquids collected from the Drains and Sewers discharging into the Water of Leith.

Temperature.		Place and Time of Collection.	In solution.			In suspension.			One imperial gallon contains in solution and suspension.		
Air.	Liquid.		Organic matter in grains.	Saline matter in grains.	Total matter in solution in grains.	Organic matter in grains.	Earthy matter in grains.	Total matter in suspension in grains.	Organic matter in grains.	Saline and earthy matter in grains.	Grand total matter in grains.
		North Sewer at Stockbridge.									
Fahr.	Fahr.	Day. Hour.									
45°	43°	18th March 1864 at 12.50 p.m.									
50°	46°	19th „ „ 11.40 a.m.	9·60	23·68	33·28	13·28	9·12	22·40	22·88	32·80	55·68
48°	44°	21st „ „ 5.15 p.m.									
48°	45°	22d „ „ 4.30 p.m.									
45°	46°	23d „ „ 3.35 p.m.	11·68	28·48	40·16	13·28	7·84	21·12	24·96	36·32	61·28
45°	45°	29th „ „ 1.30 p.m.	8·00	27·84	35·84	20·00	9·92	29·92	28·00	37·76	65·76
44°	43°	30th „ „ 8.10 a.m.	6·40	18·08	24·48	10·72	4·00	14·72	17·12	22·08	39·20
48°	44°	1st April 1864 „ 2.45 p.m.	5·44	24·32	29·76	10·72	11·68	22·40	16·16	36·00	52·16
44°	44°	2d „ „ 11.35 a.m.	8·88	23·24	32·12	13·20	9·12	22·32	22·08	32·36	54·44
56°	48°	9th „ „ 4.5 p.m.	4·16	23·68	27·84	11·68	9·12	20·80	15·84	32·80	48·64
		Average of 10 samples -	8·29	24·04	32·33	13·27	8·81	22·08	21·56	32·85	54·41
		South (Moray Place) Sewer at Stockbridge.									
48°	45°	22d March 1864 at 4.35 p.m.	5·08	26·88	31·96	11·88	6·72	18·60	16·96	33·60	50·56
45°	47°	23d „ „ 3.30 p.m.	6·80	22·24	29·04	15·60	7·52	23·12	22·40	29·76	52·16
45°	45°	29th „ „ 1.30 p.m.	5·20	24·64	29·84	16·52	10·72	27·24	21·72	35·36	57·08
48°	45°	1st April 1864 „ 2.45 p.m.	4·00	23·20	27·20	20·48	7·52	28·00	24·48	30·72	55·20
44°	45°	2d „ „ 11.44 p.m.	9·44	29·60	39·04	101·60	48·00	149·60	111·04	77·60	188·64
44°	45°	2d „ „ 11.44 p.m.	9·60	29·60	39·20	80·96	42·72	123·68	90·56	72·32	162·88
64°	54°	25th May 1864 „ 10.55 a.m.	10·16	27·44	37·60	12·32	7·52	19·84	22·48	34·96	57·44
54°	54°	26th „ „ 10.25 p.m.	8·20	17·76	25·96	10·00	7·60	17·60	18·20	25·36	43·56
53°	52°	27th „ „ 1.30 a.m.	6·52	12·80	19·32	6·80	1·80	8·60	13·32	14·60	27·92
52°	50°	27th „ „ 3.33 a.m.	5·08	12·80	17·88	4·20	1·60	5·80	9·28	14·40	23·68
51°	50°	27th „ „ 5.25 a.m.	4·80	14·84	19·64	3·28	0·80	4·08	8·08	15·64	23·72
63°	52°	27th „ „ 2.3 p.m.	9·92	27·60	37·52	13·04	6·96	20·00	22·96	34·56	57·52
		Average of 12 samples -	7·07	22·45	20·52	24·72	12·45	37·17	31·79	34·90	66·69

Table E.

Liquids collected from the Drains and Sewers discharging into the Water of Leith.

Temperature.		Place and Time of Collection.	In solution.			In suspension.			One imperial gallon contains in solution and suspension.		
Air.	Liquid.		Organic matter in grains.	Saline matter in grains.	Total matter in solution in grains.	Organic matter in grains.	Earthy matter in grains.	Total matter in suspension in grains.	Organic matter in grains.	Saline and Earthy matter in grains.	Grand total matter in grains.
		Canonmills Sewer.									
Fahr.	Fahr.	Day. Hour.									
46°	44°	14th March 1864 at 12.59 p.m.									
50°	45°	17th „ „ 2.55 p.m.									
50°	45°	18th „ „ 1.3 p.m.	8·60	23·20	31·80	16·80	13·60	30·40	25·40	36·80	62·20
50°	44°	19th „ „ 11.54 a.m.									
48°	45°	21st „ „ 5.27 p.m.									
48°	45°	22d „ „ 4.54 p.m.									
45°	46°	23d „ „ 3.50 p.m.	8·96	57·76	66·72	47·68	49·92	97·60	56·64	107·68	164·32
46°	46°	26th „ „ 11.32 a.m.	7·68	24·48	32·16	28·32	8·48	36·80	36·00	32·96	68·96
44°	45°	28th „ „ 5.40 p.m.	7·06	23·52	30·58	9·28	5·12	14·40	16·34	28·64	44·98
45°	45°	29th „ „ 1.22 p.m.	8·00	28·80	36·80	20·80	10·72	31·52	28·80	39·52	68·32
44°	44°	30th „ „ 8.18 a.m.	6·08	18·40	24·48	14·40	15·20	29·60	20·48	33·60	54·08
49°	46°	31st „ „ 2.20 p.m.	23·84	24·96	48·80	6·08	8·32	14·40	29·92	33·28	63·20
48°	46°	1st April 1864 „ 2.55 p.m.	8·00	27·20	35·20	8·08	9·92	18·00	16·08	37·12	53·20
44°	45°	2d „ „ 12 noon.	4·00	15·20	19·20	18·72	11·52	30·24	22·72	26·72	49·44
62°	55°	25th May 1864 „ 5.20 p.m.	9·52	23·20	32·72	9·12	7·52	16·64	18·64	30·72	49·36
54°	53°	26th „ „ 10.35 p.m.	8·00	23·20	31·20	8·40	2·40	10·80	16·40	25·60	42·00
53°	51°	27th „ „ 1.45 a.m.	5·24	18·36	23·60	4·28	0·80	5·08	9·52	19·16	28·68
52°	50°	27th „ „ 3.38 a.m.	4·20	15·80	20·00	1·92	0·48	2·40	6·12	16·28	22·40
51°	50°	27th „ „ 5.40 a.m.	3·60	18·40	22·00	2·72	0·48	3·20	6·32	18·88	26·20
56°	50°	27th „ „ 2.18 p.m.	8·60	25·92	34·52	10·64	8·16	18·80	19·24	34·08	53·32
59°	51°	28th „ „ 5.25 p.m.	7·76	21·44	29·20	34·88	9·92	44·80	42·64	31·36	74·00
		Average of 21 samples -	8·20	24·10	32·30	15·50	11·00	26·50	23·70	35·10	58·80

Table F.

Liquids collected from the Drains and Sewers discharging into the Water of Leith.

Temperature.		Place and Time of Collection.	In solution.			In suspension.			One imperial gallon contains in solution and suspension.		
Air.	Liquid.		Organic matter in grains.	Saline matter in grains.	Total matter in solution in grains.	Organic matter in grains.	Earthy matter in grains.	Total matter in suspension in grains.	Organic matter in grains.	Saline and earthy matter in grains.	Grand total matter in grains.
		Broughton Burn Sewer at Bonnington Road, and immediately above junction with Water of Leith.									
Fahr.	Fahr.	Day. Hour.									
65°	57°	9th April 1864 at 11.50 a.m.	9·12	22·24	31·36	14·40	10·88	25·28	23·52	33·12	56·64
64°	61°	25th May 1864 „ 3.20 p.m.	12·00	28·80	40·80	60·48	23·52	84·00	72·48	52·32	124·80
		Average of 2 samples -	10·56	25·52	36·08	37·44	17·20	54·64	48·00	42·72	90·72
		Bulls Stank Sewer at Lovers Loan.									
47°	45°	21st March 1864 at 6.5 p.m.	5·44	31·04	36·48	14·08	5·92	20·00	19·52	36·96	56·48
		Bulls Stank Sewer at Junction Road Bridge, Leith.									
45°	42°	14th March 1864 at 12.37 p.m.									
49°	45°	17th „ „ 4.8 p.m.	5·28	31·04	36·32	10·88	5·92	16·80	16·16	36·96	53·12
36°	40°	19th „ „ 8.5 a.m.									
64°	57°	25th May 1864 „ 1.1 p.m.	8·32	32·96	41·28	7·68	2·72	10·40	16·00	35·68	51·68
		Average of 5 samples -	5·92	31·42	37·34	10·88	5·28	16·16	16·80	36·70	53·50
		Coal Hill Sewer at Leith.									
45°	43°	18th March 1864 at 5.7 p.m.									
36°	49°	19th „ „ 7.50 a.m.	64·64	145·76	210·40	80·48	36·32	116·80	145·12	182·08	327·20
36°	41°	19th „ „ 7.55 a.m.									
		Sewer below Drawbridge at Leith.									
44°	46°	23d March 1864 at 6.50 p.m.	7·84	46·56	54·40	10·40	4·80	15·20	18·24	51·36	69·60

Table G.

Sedimentary Matters collected from the bottom of the open Sewers discharging into the Water of Leith.

Dried at 212° Fahr.

Temperature.		Place and time of collection.	Per-centage composition.			
Air.	Sediment.		Organic matter.	Earthy matter.	Total.	Nitrogen.
Fahr.	Fahr.					Average Amount.
51°	45°	Edinburgh Sewers, Lochrin Burn, west of Slaughter-houses, collected on 18th March 1864 at 11.35 a.m. - - - -	44·92	55·08	100·00	
50°	44°	Edinburgh Sewers, Lochrin Burn, west of Slaughter-houses, collected on 19th March 1864 at 10.35 a.m. - - - -	46·12	53·88	100·00	
50°	45°	Edinburgh Sewers, Lochrin Burn, west of Slaughter-houses, collected on 21st March 1864 at 4.10 p.m. - - - -	67·72	32·28	100·00	1·30
48°	45°	Edinburgh Sewers, Lochrin Burn, west of Slaughter-houses, collected on 22d March 1864 at 3.12 p.m. - - - -	52·44	47·56	100·00	
47°	46°	Edinburgh Sewers, Lochrin Burn, west of Slaughter-houses, collected on 23d March 1864 at 12.30 p.m. - - - -	55·32	44·68	100·00	
69°	57°	Edinburgh Sewers, Lochrin Burn, west of Slaughter-houses, collected on 20th May 1864 at 12.20 p.m. - - - -	46·12	53·88	100·00	1·20
64°	54°	Edinburgh Sewers, Lochrin Burn, west of Slaughter-houses, collected on 25th May 1864 at 10.25 a.m. - - - -	35·32	64·68	100·00	
		Average of 7 samples -	49·70	50·30	100·00	1·27
48°	52°	Edinburgh Sewers, Lochrin Burn above Caledonian Distillery, collected on 22d March 1864 at 3.35 p.m. - - - -	26·12	73·88	100·00	0·57
47	53°	Edinburgh Sewers, Lochrin Burn, above Caledonian Distillery, collected on 23d March 1864 at 1 p.m. - - - - -	36·44	63·56	100·00	
64	65°	Edinburgh Sewers, Lochrin Burn, above Caledonian Distillery, collected on 20th May 1864 at 12.40 p.m. - - - -	20·52	79·48	100·00	0·42
		Average of 3 samples -	27·70	72·30	100·00	0·52
50	44°	Edinburgh Sewers, Lochrin Burn, above Coltbridge, collected on 19th March 1864 at 11.12 a.m. -	14·52	85·48	100·00	0·77
48°	43°	Edinburgh Sewers, Lochrin Burn, above Coltbridge, collected on 22d March 1864 at 3.55 p.m. -	17·20	82·80	100·00	
64°	63°	Edinburgh Sewers, Lochrin Burn, above Coltbridge, collected on 20th May 1864 at 1 p.m. - -	19·32	80·68	100·00	0·58
		Average of 3 samples -	17·02	82·98	100·00	0·71
47	45°	Edinburgh Sewers, Bulls Stank at Lovers Loan, collected on 21st March 1864 at 6.10 p.m. - -	50·72	49·28	100·00	0·76
65°	57°	Edinburgh Sewers, Broughton Burn, at Bonnington Road, collected on 9th April 1864 at 12 noon - - - - -	20·52	79·48	100·00	0·82

Table H.

Liquids collected from the Water of Leith above Coltbridge.

Temperature.		Place and Time of Collection.	In solution.			In suspension.			One imperial gallon contains in solution and suspension.		
Air.	Liquid.		Organic matter in grains.	Saline matter in grains.	Total matter in solution in grains.	Organic matter in grains.	Earthy matter in grains.	Total matter in suspension in grains.	Organic matter in grains.	Saline and earthy matter in grains.	Grand total matter in grains.
Fahr.	Fahr.										
44°	35°	Harelaw Reservoir on 24th March 1864 at 11.4 a.m. -	2·32	3·88	6·20	0·24	2·72	2·96	2·56	6·60	9·16
44°	35°	Bavelaw Burn above Works, on 24th March 1864 at 11.22 a.m. - - -	2·60	4·60	7·20	1·16	1·72	2·88	3·76	6·32	10·08
46°	41°	Bavelaw Burn, below Hill's Mill, on 24th March 1864 at 12.30 p.m. - - -	2·60	5·60	8·20	1·83	1·12	2·95	4·43	6·72	11·15
47°	41°	Water of Leith above Balerno Bridge, on 24th March 1864 at 12.35 p.m. - - -	1·64	8·80	10·44	0·36	2·72	3·08	2·00	11·52	13·52
47°	41°	Water of Leith above Kinleith Mill, on 24th March 1864 at 1.10 p.m. - -	3·36	7·04	10·40	0·96	2·02	2·98	4·32	9·06	13·38
47°	41°	Water of Leith below Kinleith Mill, on 24th March 1864 at 1.45 p.m. - -	4·32	8·08	12·40	1·12	3·36	4·48	5·44	11·44	16·88
47°	41°	Water of Leith above Katesmill, on 24th March 1864 at 2.30 p.m. - - -	4·00	9·60	13·60	1·76	4·80	6·56	5·76	14·40	20·16
47°	41°	Water of Leith below Katesmill, on 24th March 1864 at 2.45 p.m. - - -	7·20	16·80	24·00	1·28	2·64	3·92	8·48	19·44	27·92
47°	41°	Water of Leith below Katesmill, on 24th March 1864 at 2.45 p.m. - - -	8·00	17·92	25·92	1·33	2·72	4·05	9·33	20·64	29·97
47°	42°	Water of Leith at Gorgie Dam, on 24th March 1864 at 3.40 p.m. - -	4·36	10·40	14·76	2·84	3·52	6·36	7·20	13·92	21·12
61°	52°	Water of Leith at Gorgie Dam, on 27th May 1864 at 12.45 p.m. - - -	3·76	13·28	17·04	0·76	0·51	1·27	4·52	13·79	18·31
		Water of Leith immediately above Coltbridge.									
48°	42°	17th March 1864 at 2.18 p.m.									
47°	47°	18th " " 12.20 p.m.									
50°	42°	19th " " 11.20 a.m.	3·70	11·36	15·06	2·56	3·52	6·08	6·26	14·88	21·14
47°	41°	21st " " 4.57 p.m.									
48°	43°	22d " " 4.1 p.m.									
50°	43°	23d " " 1.35 p.m.	2·68	12·32	15·00	2·64	3·04	5·68	5·32	15·36	20·68
50°	43°	23d " " 1.40 p.m.	2·56	12·48	15·04	2·12	3·04	5·16	4·68	15·52	20·20
47°	41°	24th " " 4.0 p.m.	3·96	9·60	13·56	2·40	3·52	5·92	6·36	13·12	19·48
44°	41°	26th " " 11.10 a.m.	3·96	13·76	17·72	1·28	3·52	4·80	5·24	17·28	22·52
44°	41°	28th " " 5.15 p.m.	3·00	12·20	15·20	2·88	2·72	5·60	5·88	14·92	20·80
45°	42°	29th " " 1.55 p.m.	3·68	14·40	18·08	1·28	2·72	4·00	4·96	17·12	22·08
44°	41°	30th " " 7.45 a.m.	3·36	11·66	15·02	1·60	3·20	4·80	4·96	14·86	19·82
49°	43°	31st " " 1.55 p.m.	3·20	11·36	14·56	0·48	1·12	1·60	3·68	12·48	16·16
48°	43°	1st April 1864 " 2.22 p.m.	2·24	13·12	15·36	0·80	2·72	3·52	3·04	15·84	18·88
44°	40°	2nd " " 10.10 a.m.	1·80	10·08	11·88	2·20	3·20	5·40	4·00	13·28	17·28
56°	54°	7th " " 1.45 p.m.	3·32	16·00	19·32	2·00	3·00	5·00	5·32	19·00	24·32
64°	60°	20th May 1864 " 1.10 p.m.	3·60	15·60	19·20	1·28	1·12	2·40	4·88	16·72	21·60
62°	58°	25th " " 6.45 p.m.	3·40	16·64	20·04	0·98	0·36	1·34	4·38	17·00	21·38
54°	57°	26th " " 9.40 p.m	3·80	14·24	18·04	1·60	0·80	2·40	5·40	15·04	20·44
53°	55°	27th " " 12·40 a.m.	2·56	12·80	15·36	1·28	0·32	1·60	3·84	13·12	16·96
52°	56°	27th " " 2.50 a.m.	3·84	13·60	17·44	0·96	0·32	1·28	4·80	13·92	18·72
51°	54°	27th " " 4.49 a.m.	4·16	15·04	19·20	0·48	0·32	0·80	4·64	15·36	20·00
62°	53°	27th " " 1.0 p.m.	3·28	16·32	19·60	0·80	0·80	1·60	4·08	17·12	21·20
		Average of 23 samples -	3·34	12·96	16·30	1·73	2·32	4·05	5·07	15·28	20·35

Table I.

Liquids collected from the Water of Leith from Coltbridge down to dam below Water of Leith Village.

Temperature. Air.	Temperature. Liquid.	Place and Time of Collection.	In solution. Organic matter in grains.	In solution. Saline matter in grains.	In solution. Total matter in solution in grains.	In suspension. Organic matter in grains.	In suspension. Saline matter in grains.	In suspension. Total matter in suspension in grains.	One imperial gallon contains in solution and suspension. Organic matter in grains.	One imperial gallon contains in solution and suspension. Saline and earthy matter in grains.	One imperial gallon contains in solution and suspension. Grand total matter in grains.
		Water of Leith at dam below Coltbridge.									
Fahr.	Fahr.	Day. Hour.									
62°	58°	25th May 1864 at 7.0 p.m.	6·40	16·80	23·20	2·96	1·32	4·28	9·36	18·12	27·48
		Water of Leith at dam above Water of Leith village.									
50°	43°	23d March 1864 at 2 35 p.m.	4·32	12·48	16·80	4·64	2·88	7·52	8·96	15·36	24·32
56°	54°	7th April 1864 „ 2.20 p.m.	4·88	11·20	16·08	6·54	3·20	9·74	11·42	14·40	25·82
		Average of 2 samples -	4·60	11·84	16·44	5·59	3·04	8·63	10·19	14·88	25·07
		Water of Leith at dam below Water of Leith village.									
44°	42°	2d April 1864 at 10.30 a.m.	4·64	14·56	19·20	14·40	4·32	18·72	19·04	18·88	37·92
56°	54°	7th „ „ 2.10 p.m.	4·48	11·20	15·68	4·00	1·12	5·12	8·48	12·32	20·80
64°	61°	20th May 1864 „ 1.52 p.m.	6·40	15·20	21·60	3·20	2·24	5·44	9·60	17·44	27·04
54°	56°	26th „ „ 9.55 p.m.	6·08	17·60	23·68	2·40	0·48	2·88	8·48	18·08	26·56
53°	55°	27th „ „ 1.0 a.m.	4·64	15·52	20·16	3·68	1·12	4·80	8·32	16·64	24·96
52°	54°	27th „ „ 3.5 a.m.	5·60	13·60	19·20	2·08	0·80	2·88	7·68	14·40	22·08
51°	54°	27th „ „ 5.5 a.m.	5·40	15·36	20·76	1·64	0·38	2·02	7·04	15·74	22·78
64°	53°	27th „ „ 1.35 p.m.	5·68	16·40	22·08	2·80	0·60	3·40	8·48	17·00	25·48
		Average of 8 samples -	5·36	14·93	20·29	4·27	1·38	5·65	9·63	16·31	25·94

Table K.

Liquids collected from the Water of Leith from the dam below Water of Leith Village (where Edinburgh Lade begins) to St. Mark's Place (where Edinburgh Lade again joins the stream).

Temperature. Air.	Temperature. Liquid.	Place and Time of Collection.	In solution. Organic matter in grains.	In solution. Saline matter in grains.	In solution. Total matter in solution in grains.	In suspension. Organic matter in grains.	In suspension. Earthy matter in grains.	In suspension. Total matter in suspension in grains.	One imperial gallon contains in solution and suspension. Organic matter in grains.	One imperial gallon contains in solution and suspension. Saline and earthy matter in grains.	One imperial gallon contains in solution and suspension. Grand total matter in grains.
		Water of Leith under Dean Bridge.									
Fahr.	Fahr.	Day. Hour.									
62°	58°	25th May 1864 at 6.25 p.m.	14·40	14·24	28·64	3·08	1·12	4·20	17·48	15·36	32·84
54°	56°	26th „ „ 10.0 p.m.	7·52	14·56	22·08	2·96	0·64	3·60	10·48	15·20	25·68
53°	55°	27th „ „ 1.5 a.m.	5·20	19·20	24·40	2·40	0·80	3·20	7·60	20·00	27·60
52°	54°	27th „ „ 3.10 a.m.	5·36	15·60	20·96	2·96	0·64	3·60	8·32	16·24	24·56
51°	54°	27th „ „ 5.10 a.m.	4·80	14·80	19·60	2·36	0·46	2·82	7·16	15·26	22·42
64°	53°	27th „ „ 1.40 p.m.	7·08	16·00	23·08	2·80	0·50	3·30	9·88	16·50	26·38
		Average of 6 samples -	7·39	15·73	23·12	2·76	0·69	3·45	10·15	16·42	26·57

Table K.—*continued.*

Liquids collected from the Water of Leith from the dam below Water of Leith Village (where Edinburgh Lade begins) to St. Mark's Place (where Edinburgh Lade again joins the stream).

Temperature.		Place and Time of Collection.	In solution.			In suspension.			One imperial gallon contains in solution and suspension.		
Air.	Liquid.		Organic matter in grains.	Saline matter in grains.	Total matter in solution in grains.	Organic matter in grains.	Earthy matter in grains.	Total matter in suspension in grains.	Organic matter in grains.	Saline and earthy matter in grains.	Grand total matter in grains.
		Water of Leith behind Moray Place, near St. Bernard's Well.									
Fahr. 62°	Fahr. 58°	Day. 25th May 1864 at Hour. 6.10 p.m.	11·68	18·40	30·08	3·43	0·82	4·30	15·16	19·22	34·38
54°	56°	26th „ „ 10.10 p.m.	7·60	15·20	22·80	2·86	0·64	3·50	10·46	15·84	26·30
53°	55°	27th „ „ 1.20 a.m.	6·40	19·20	25·60	2·76	0·64	3·40	9·16	19·84	29·00
52°	54°	27th „ „ 3.20 a.m.	5·48	16·80	22·28	2·12	0·48	2·60	7·60	17·28	24·88
51°	54°	27th „ „ 5.10 a.m.	3·52	14·40	17·92	1·96	0·56	2·52	5·48	14·96	20·44
64°	53°	27th „ „ 1.50 p.m.	6·48	11·52	18·00	3·32	1·06	4·38	9·80	12·58	22·38
		Average of 6 samples -	6·86	15·08	21·94	2·75	0·70	3·45	9·61	15·78	25·39
		Water of Leith immediately above Stockbridge.									
64°	58°	25th May 1864 at 10.55 a.m.	13·60	16·80	30·40	3·12	0·60	3·72	16·72	17·40	34·12
54°	55°	26th „ „ 10.27 p.m.	6·40	14·40	20·80	2·80	0·76	3·56	9·20	15·16	24·36
53°	55°	27th „ „ 1.34 a.m.	6·00	18·56	24·56	2·92	0·48	3·40	8·92	19·04	27·96
52°	54°	27th „ „ 3.30 a.m.	5·80	17·60	23·40	1·96	0·64	2·60	7·76	18·24	26·00
51°	54°	27th „ „ 5.28 a.m.	6·40	14·40	20·80	1·84	0·42	2·26	8·24	14·82	23·06
63°	52°	27th „ „ 2.6 p.m.	6·00	15·20	21·20	2·64	0·60	3·24	8·64	15·80	24·44
		Average of 6 samples -	7·36	16·16	23·52	2·55	0·58	3·13	9·91	16·74	26·65
		Water of Leith 30 yards below Stockbridge.									
64°	56°	25th May 1864 at 10.45 a.m.	13·76	14·40	28·16	41·12	5·72	46·84	54·88	20·12	75·00
64°	56°	25th „ „ 10.45 a.m.	16·00	16·00	32·00	32·88	4·92	37·80	48·88	20·92	69·80
62°	55°	25th „ „ 5.40 p.m.	10·40	20·96	31·36	11·44	1·12	12·56	21·84	22·08	43·92
54°	53°	26th „ „ 10.30 p.m.	6·76	15·36	22·12	4·48	3·24	7·72	11·24	18·60	29·84
53°	54°	27th „ „ 1.36 a.m.	7·20	14·12	21·32	4·64	1·16	5·80	11·84	15·28	27·12
52°	53°	27th „ „ 3.33 a.m.	5·44	14·80	20·24	4·80	0·83	5·63	10·24	15·63	25·87
51°	53°	27th „ „ 5.30 a.m.	5·00	13·28	18·28	3·28	2·32	5·60	8·28	15·60	23·88
63°	52°	27th „ „ 2.8 p.m.	6·96	13·60	20·56	12·64	1·32	13·96	19·60	14·92	34·52
59°	52°	28th „ „ 5.45 p.m.	8·80	16·00	24·80	12·88	1·92	14·80	21·68	17·92	39·60
		Average of 9 samples -	8·92	15·40	24·32	14·24	2·50	16·74	23·16	17·90	41·06
		Water of Leith behind Warriston Crescent.									
62°	60°	25th May 1864 at 5.10 p.m.	7·04	25·60	32·64	10·68	3·52	14·20	17·72	29·12	46·84

Table L.

Liquids collected from the Edinburgh Lade flowing from the Dam below Water of Leith Village to St. Mark's Place.

Temperature.		Place and Time of Collection.	In solution.			In suspension.			One imperial gallon contains in solution and suspension.		
Air.	Liquid.		Organic matter in grains.	Saline matter in grains.	Total matter in solution in grains.	Organic matter in grains.	Earthy matter in grains.	Total matter in suspension in grains.	Organic matter in grains.	Saline and earthy matter in grains.	Grand total matter in grains.
Fahr.	Fahr.	Water of Leith Lade behind India Place.									
		Day. Hour.									
64°	61°	20th May 1864 at 2.30 p.m.	7·36	15·44	22·80	3·68	2·52	6·20	11·04	17·96	29·00
54°	56°	26th „ „ 10.12 p.m.	7·20	16·20	23·40	2·44	0·96	3·40	9·64	17·16	26·80
53°	55°	27th „ „ 1.25 a.m.	4·80	15·80	20·60	2·72	0·48	3·20	7·52	16·28	23·80
52°	54°	27th „ „ 3.25 a.m.	4·96	20·00	24·96	2·28	0·32	2·60	7·24	20·32	27·56
51°	54°	27th „ „ 5.22 a.m.	5·60	18·80	24·40	2·56	0·64	3·20	8·16	19·44	27·60
63°	53°	27th „ „ 1.55 p.m.	6·40	16·60	23·00	3·36	1·44	4·80	9·76	18·04	27·80
		Average of 6 samples -	6·05	17·14	23·19	2·84	1·06	3·90	8·89	18·20	27·09
		Water of Leith Lade below Beaver Hall.									
64°	60°	25th May 1864 at 4.35 p.m.	12·00	18·40	30·40	3·64	1·92	5·56	15·64	20·32	35·96
54°	51°	27th „ „ 2.35 p.m.	8·40	16·16	24·56	8·40	0·80	9·20	16·80	16·96	33·76
		Average of 2 samples -	10·20	17·28	27·48	6·02	1·36	7·38	16·22	18·64	34·86

Table M.

Liquids collected from the Water of Leith at St. Mark's Place after junction with the Edinburgh Lade.

Temperature.		Place and Time of Collection.	In solution.			In suspension.			One imperial gallon contains in solution and suspension.		
Air.	Liquid.		Organic matter in grains.	Saline matter in grains.	Total matter in solution in grains.	Organic matter in grains.	Earthy matter in grains.	Total matter in suspension in grains.	Organic matter in grains.	Saline and earthy matter in grains.	Grand total matter in grains.
Fahr.	Fahr.	St. Mark's Place below junction of Lade.									
		Day. Hour.									
50°	43°	17th March 1864 at 3.3 p.m.	3·52	9·76	13·28	5·28	3·52	8·80	8·80	13·28	22·08
48°	44°	22d „ „ 5.2 p.m.									
48°	44°	22d „ „ 5.12 p.m.	3·20	15·52	18·72	4·80	8·00	12·80	8·00	23·52	31·52
44°	44°	23d „ „ 4.5 p.m.	7·20	14·72	21·92	6·88	5·12	12·00	14·08	19·84	33·92
46°	45°	26th „ „ 11.40 a.m.	7·52	14·72	22·24	11·68	5·12	16·80	19·20	19·84	39·04
44°	42°	28th „ „ 5.50 p.m.	6·72	11·52	18·24	5·28	5·92	11·20	12·00	17·44	29·44
45°	43°	29th „ „ 1.15 p.m.	9·76	16·00	25·76	14·40	5·92	20·32	24·16	21·92	46·08
44°	42°	30th „ „ 8.25 a.m.	9·60	14·56	24·16	3·12	2·00	5·12	12·72	16·56	29·28
49°	46°	31st „ „ 2.30 p.m.	6·40	10·40	16·80	4·16	5·12	9·28	10·56	15·52	26·08
48°	46°	1st April 1864 „ 3 p.m.	11·60	16·96	28·56	41·48	14·72	56·20	53·08	31·68	84·76
44°	43°	2d „ „ 12.8 p.m.	9·36	14·72	24·08	23·28	29·92	53·20	32·64	44·64	77·28
64°	62°	20th May 1864 „ 2.55 p.m.	8·80	16·00	24·80	26·88	29·12	56·00	35·68	45·12	80·80
64°	60°	25th „ „ 4.45 p.m.	21·44	18·00	39·44	143·36	145·12	288·48	164·80	163·12	327·92
54°	53°	26th „ „ 10·40 p.m.	6·68	19·20	25·88	4·92	2·48	7·40	11·60	21·68	33·28
53°	54°	27th „ „ 1·49 a.m.	6·00	16·80	22·80	4·76	2·32	7·08	10·76	19·12	29·88
52°	53°	27th „ „ 3·45 a.m.	7·60	16·80	24·40	3·20	1·80	5·00	10·80	18·60	29·40
51°	53°	27th „ „ 5.50 a.m.	6·40	13·60	20·00	5·44	1·96	7·40	11·84	15·56	27·40
62°	52°	27th „ „ 2.30 p.m.	8·32	15·20	23·52	18·24	3·16	21·40	26·56	18·36	44·92
		Average of 18 samples -	7·98	14·68	22·66	18·47	15·27	33·73	26·45	29·95	56·39

Table N.

Liquids collected from the Water of Leith from St. Mark's Place down to the Harbour of Leith.

Temperature. Air.	Temperature. Liquid.	Place and Time of Collection.	In solution. Organic matter in grains.	In solution. Saline matter in grains.	In solution. Total matter in solution in grains.	In suspension. Organic matter in grains.	In suspension. Earthy matter in grains.	In suspension. Total matter in suspension in grains.	One imperial gallon contains in solution and suspension. Organic matter in grains.	One imperial gallon contains in solution and suspension. Saline and earthy matter in grains.	One imperial gallon contains in solution and suspension. Grand total matter in grains.
Fahr.	Fahr.	Water of Leith from Dam above Bonnington. Day. Hour.									
64°	61°	25th May 1864 at 4.15 p.m.	12·80	17·80	30·60	115·68	153·12	268·80	128·48	170·92	299·40
		Water of Leith at Boundary of Edinburgh and Leith at Bonnington Bridge.									
64°	62°	25th May 1864 at 3.45 p.m.	10·24	17·60	27·84	30·88	33·12	64·00	41·12	50·72	91·84
		Water of Leith from Dam above Junction Road Bridge.									
64°	61°	25th May 1864 at 3 p.m.	16·96	21·92	38·88	500·96	369·12	870·08	517·92	391·04	908·96
		Water of Leith above Saw-mills.									
36°	40°	19th March 1864 at 8.22 a.m.	4·32	10·08	14·40	5·20	3·52	8·72	9·52	13·60	23·12
		Water of Leith below Junction Road Bridge and off Bulls Stank Sewer.									
49°	44°	17th March 1864 at 4.10 p.m.	4·32	12·32	16·64	3·36	4·64	8·00	7·68	16·96	24·64
64°	61°	25th May 1864 „ 1 p.m.	14·04	24·32	38·36	4·08	1·92	6·00	18·12	26·24	44·36
		Average of 2 samples -	9·18	18·32	27·50	3·72	3·28	7·00	12·90	21·60	34·50
		Water of Leith above Coal Hill.									
45° 46°	43° 43°	18th March 1864 at 5.13 p.m. 21st „ „ 5.45 p.m.	8·64	76·00	84·64	10·88	5·92	16·80	19·52	81·92	101·44
45°	44°	29th „ „ 12.55 p.m.	9·76	44·80	54·56	21·12	5·92	27·04	30·88	50·72	81·60
		Average of 3 samples -	9·01	65·60	74·61	14·29	5·92	20·21	23·30	71·52	94·82
		Water of Leith from off Coal Hill Sewer.									
42°	42°	23d March 1864 at 6.35 p.m.	35·20	170·08	205·28	8·32	6·72	15·04	43·52	176·80	220·32
		Water of Leith from harbour at Upper Drawbridge.									
54°	56°	26th May 1864 at 11 p.m.	27·36	157·76	185·12	4·16	3·84	8·00	31·52	161·60	193·12
		Water of Leith below Upper Drawbridge.									
42°	42°	25th March 1864 at 6.45 p.m.	31·84	609·60	641·44	10·72	10·40	21·12	42·56	620·00	662·56
		Water of Leith in harbour off Victoria Dock Head.									
64°	52°	25th May 1864 at 12.20 p.m. Low Water.	3·92	1208·80	1212·72	1·32	1·12	2·44	5·24	1209·92	1215·16

Table O.

Sedimentary Matters collected from the Bed of the Water of Leith, and from the Bottom of the Edinburgh Lade.

Dried at 212° Fahr.

Temperature.		Place and Time of Collection.	Per-centage composition.			
Air.	Sediment.		Organic matter.	Earthy matter.	Total.	Nitrogen.
Fahr.	Fahr.	Bed of Water of Leith.				
50°	43°	Underneath dam below Water of Leith Village, collected on 23d March 1864 at 2.10 p.m.	82·12	17·88	100·00	2·04
44°	42°	From dam below Water of Leith Village, collected on 2d April 1864 at 10.40 a.m.	35·32	64·68	100·00	
64°	61°	From dam below Water of Leith Village, collected on 20th May 1864 at 1.32 p.m.	35·72	64·28	100·00	1·12
64°	61°	Below Dean Bridge, collected on 20th May 1864 at 1.40 p.m.	39·32	60·68	100·00	1·31
		Average of 4 samples	48·12	51·88	100·00	1·63
44°	42°	Behind Ainslie and Moray Place, collected on 2d April 1864 at 11.25 a.m.	49·72	50·28	100·00	0·98
64°	61°	Behind Ainslie and Moray Place, collected on 20th May 1864 at 2 p.m.	40·12	59·88	100·00	
		Average of 2 samples	44·92	55·08	100·00	0·98
45°	43°	Sediment lying in bed of Water of Leith, 4 to 6 yards below North Sewer at Stockbridge, collected on 18th March 1864 at 12.55 p.m.	41·52	58·48	100·00	1·14
50°	46°	Sediment lying in bed of Water of Leith, 4 to 6 yards below North Sewer at Stockbridge, collected on 19th March at 11.40 a.m.	23·92	76·08	100·00	
48°	44°	Sediment lying in bed of Water of Leith, 4 to 6 yards below North Sewer at Stockbridge, collected on 21st March 1864 at 5.20 p.m.	48·32	51·68	100·00	
48°	45°	Sediment lying in bed of Water of Leith, 4 to 6 yards below North Sewer at Stockbridge, collected on 22d March 1864 at 4.35 p.m.	66·52	33·48	100·00	
48°	45°	Sediment lying in bed of Water of Leith, below South Sewer at Stockbridge, collected on 22d March 1864 at 4.45 p.m.	37·12	62·88	100·00	
45°	46°	Sediment lying in bed of Water of Leith, below North and South Sewers at Stockbridge, collected on 23d March 1864 at 3.35 p.m.	28·56	71·44	100·00	
48	44°	Sediment lying in bed of Water of Leith below North and South Sewers at Stockbridge, collected on 1st April 1864 at 2.45 p.m.	54·56	45·44	100·00	
44°	45°	Sediment lying in bed of Water of Leith below North and South Sewers at Stockbridge, collected on 2d April 1864 at 11.45 a.m.	48·80	51·20	100·00	
		Average of 8 samples	43·67	56·33	100·00	1·14
64°	61°	Sides of narrowed channel of Water of Leith at Stockbridge below sewers, collected on 20th May 1864 at 2.40 p.m.	34·52	65·48	100·00	0·50
62°	59°	Eighty yards below Stockbridge, collected on 25th May 1864 at 2.55 p.m.	25·12	74·88	100·00	1·08
62°	59°	Behind Malta Terrace, collected on 25th May 1864 at 5.30 p.m.	32·52	67·48	100·00	

Table O.—*continued.*

Sedimentary Matters collected from the Bed of the Water of Leith, and from the Bottom of the Edinburgh Lade.

Dried at 212° Fahr.

Temperature. Air.	Temperature. Sediment.	Place and Time of Collection.	Per-centage composition. Organic matter.	Earthy matter.	Total.	Nitrogen.
Fahr.	Fahr.	Bed of Water of Leith—*cont.*				
50°	45°	Sediment in bed of Water of Leith in front of sewer at Canonmills, collected on 18th March 1864 at 1.5 p.m. - - - -	31·72	68·28	100·00	0·57
62°	60°	Behind Warriston Crescent, collected on 25th May 1864 at 5.10 p.m. - - - - -	13·32	86·68	100·00	0·55
48°	44°	At St. Mark's Place, collected on 22d March 1864 at 5.12 p.m. - -	40·72	59·28	100·00	
44°	44°	At St. Mark's Place, collected on 23d March 1864 at 4.5 p.m. - -	41·24	58·76	100·00	
44°	43°	At St. Mark's Place, collected on 2d April 1864 at 12.10 p.m. - -	24·40	75·60	100·00	1·14
62°	50°	At St. Mark's Place, collected on 9th April 1864 at 3.45 p.m. - -	40·52	59·48	100·00	
64°	62°	At St. Mark's Place, collected on 20th May 1864 at 2.55 p.m. - -	40·52	59·48	100·00	
62°	60°	At St. Mark's Place, collected on 25th May 1864 at 4.50 p.m. - -	30·92	69·08	100·00	
54°	53°	At St. Mark's Place, collected on 27th May 1864 at 5.55 p.m. - -	44·70	55·30	100·00	1·08
62°	60°	At St. Mark's Place, collected on 25th May 1864 (green matter) at 5 p.m.	48·12	51·88	100·00	
		Average of 9 samples -	36·05	63·95	100·00	1·05
64°	61°	At dam above Bonnington, collected on 25th May 1864 at 4.15 p.m. -	49·72	50·28	100·00	1·40
64°	62°	At Boundary of Edinburgh and Leith at Bonnington Bridge, collected on 25th May 1864 at 3.45 p.m. - - - - -	26·92	73·08	100·00	0·70
64°	61°	Immediately below the junction of the Broughton Burn, collected on 9th April 1864 at 12.5 p.m. -	13·72	86·28	100·00	0·52
64°	61°	Dam above Junction Road Bridge, collected on 25th May 1864 at 3.5 p.m. - - - - -	27·72	72·28	100·00	0·70
		Water of Leith Lade which traverses Edinburgh.				
44°	42°	Mud taken from lade behind Ainslie Place, collected on 2d April 1864 at 10.45 a.m. - - - -	12·52	87·48	100·00	0·34
44°	42°	Mud taken from lade behind Moray Place, collected on 2d April 1864 at 11.0 a.m. - - - -	21·48	78·52	100·00	0·62
64°	61°	Mud taken from lade behind Moray and Ainslie Places, collected on 20th May 1864 at 2.10 p.m. -	11·32	88·68	100·00	0·46
50°	43°	Mud taken from lade behind India Place, collected on 23d March 1864 at 3.20 p.m. - - - -	21·12	78·88	100·00	0·59
56°	42°	Mud taken from lade behind India Place, collected on 7th April 1864 at 3.15 p.m. - - - -	37·00	63·00	100·00	0·84
64°	61°	Mud taken from lade behind India Place, collected on 20th May 1864 at 2.25 p.m. - - - -	20·92	79·08	100·00	0·62
44°	42°	Mud taken from lade above Canonmills, collected on 2d April 1864 at 12.3 p.m. - - -	55·52	44·48	100·00	1·34
		Average of 7 samples -	25·70	74·30	100·00	0·69

Table P.

Sedimentary Matters collected from the bed of the Harbour of Leith. Dried at 212° Fahrenheit.

Temperature.		Place and Time of Collection.	Per-centage composition.			
Air.	Sediment.		Organic matter.	Earthy matter.	Total.	Nitrogen.
Fahr.	Fahr.					
36°	41°	South-east side of harbour of Leith, bank below Junction Road Bridge, and off Bulls Stank Sewer, collected on 19th March 1864 at 8.10 p.m. - - - -	31·40	68·60	100·00	
42°	42°	South-east side of harbour of Leith, bank above Coalhill, collected on 23d March 1864 at 7.15 p.m. -	47·72	52·28	100·00	
46°	45°	South-east side of harbour of Leith, 10 yards above Coalhill, collected on 21st March 1864 at 5.48 p.m. -	21·92	78·08	100·00	
45°	45°	South-east side of harbour of Leith, 10 yards above Coalhill, collected on 29th March 1864 at 12.55 p.m. -	52·50	47·50	100·00	0·84
36°	41°	South-east side of harbour of Leith, 3 yards in front of Coalhill, collected on 19th March 1864 at 7.52 a.m. - - - - -	60·28	39·72	100·00	
42°	42°	South-east side of harbour of Leith, alongside Coalhill, collected on 23d March 1864 at 6.30 p.m. -	27·72	72·28	100·00	
64°	56°	South-east side of harbour of Leith, between drawbridges, collected on 25th May 1864 at 11.40 a.m. -	10·52	89·48	100·00	0·41
42°	42°	South-east side of harbour of Leith, below second drawbridge, collected on 23d March 1864 at 6.55 p.m. - - - -	10·36	89·64	100·00	0·43
64°	54°	South-east side of harbour of Leith, below second drawbridge, collected on 25th May 1864 at 12.15 p.m. - - - -	16·92	83·08	100·00	0·57
42°	42°	South-east side of harbour of Leith, off Ferry Boat Stairs, collected on 23d March 1864 at 7.0 p.m. -	18·72	81·28	100·00	0·61
64°	52°	South-east side of harbour of Leith, at entrance to Prince of Wales Graving Dock, collected on 25th May 1864 at 12.30 p.m. -	15·72	84·28	100·00	0·58
60°	50°	South-east side of harbour of Leith, at entrance to Prince of Wales Graving Dock, collected on 28th May 1864 (Dredger) at 2.45 p.m. -	26·20	73·80	100·00	
		Average of 12 samples -	28·33	71·67	100·00	0·64
36°	41°	North-west side of harbour of Leith, opposite Coalhill, collected on 19th March 1864 at 7.45 a.m. - -	25·32	74·68	100·00	
42°	42°	North-west side of harbour of Leith, at upper drawbridge, collected on 23d March 1864 at 6.25 p.m. -	22·05	77·95	100·00	0·63
42°	42°	North-west side of harbour of Leith, opposite Fishmarket, collected on 23d March 1864 at 6.40 p.m. -	32·20	67·80	100·00	
42°	42°	North-west side of harbour of Leith, below Second Drawbridge, collected on 23d March 1864 at 6.50 p.m. - - - -	16·84	83·16	100·00	
64°	54°	North-west side of harbour of Leith, at side of Custom-house, collected on 25th May 1864 at 11.35 a.m. -	12·52	87·48	100·00	0·41
64°	52°	North-west side of harbour of Leith, off bank at west side of Jetty Head, entrance to Victoria Dock, collected on 25th May 1864 at 12.10 p.m. - - - -	12·12	87·88	100·00	
		Average of 6 samples -	20·18	79·82	100·00	0·62

Table Q.

Gases evolved during the decomposition of the Sedimentary Matters lying in the Edinburgh Sewers and in the Bed of the Water of Leith.

Temperature of Sediment.	Places and Time of Collection.	Per-centage composition of the gases by volume.		
		Carbonic acid.	Oxygen.	Other gases.
Fahr. 45°	Gases evolved from sediment in Lochrin Burn, west of Slaughter-houses, collected on 14th April 1864 -	14·63	0·81	84·56, combustible with blue-white flame.
46°	Gases evolved from sediment in bed of Water of Leith at Coltbridge, collected on 14th April 1864 - - -	6·21	0·69	93·10 ,, ,,
	Gases evolved from sediment in bed of Water of Leith at Coltbridge, collected on 30th May 1864 at 7 p.m. -	12·00	1·20	86·80 ,, ,,
47°	Gases evolved from sediment in bed of Water of Leith, behind Moray Place near St. Bernard's Well, collected on 14th April 1864 - - - -	14·65	0·32	85·03 ,, ,,
54°	Gases evolved from sediment in bed of Water of Leith, behind Moray Place near St. Bernard's Well, collected on 30th May 1864 at 6·35 p.m. -	3·60	1·80	94·60 ,, ,
47°	Gases evolved from sediment in lade behind India Place, collected on 14th April 1864 - - - -	1·56	1·56	96·88 , ,,
54°	Gases evolved from sediment in lade behind India Place, collected on 30th May 1864 at 6·20 p.m. - - -	1·60	1·40	97·00 ,, ,,
54°	Gases evolved from sediment in bed of Water of Leith, below Stockbridge, on 30th May 1864 at 6·5 p.m. -	4·30	0·50	95·20 ,, ,,
54°	Gases evolved from sediment in bed of Water of Leith, behind Warriston Crescent, collected on 30th May 1864 at 5·50 p.m. - - - - - -	4·90*	1·60	93·50 ,, ,,
47°	Gases evolved from sediment in bed of Water of Leith, at St. Mark's Place, collected on 14th April 1864 -	3·63	2·17	94·20 ,, ,,
54°	Gases evolved from sediment in bed of Water of Leith, at St. Mark's Place, collected on 30th May 1864 at 5·30 p.m. - - - - -	4·80	1·90	93·30 ,, ,,
54°	Gases evolved from sediment in bed of Water of Leith, at dam above Junction Road Bridge, collected on 30th May 1864 at 5 p.m. - - - - -	9·50	1·40	89·10 ,, ,,
55°	Gases evolved from sediment in bed of Harbour of Leith between Upper and Lower Drawbridges, collected on 30th May 1864 at 4·40 p.m. - - -	25·60*	1·80	72·60 ,, ,,
55°	Gases evolved from sediment in bed of Harbour of Leith off Jetty Head at entrance to Victoria Dock, collected on 30th May 1864 at 4·30 p.m. - -	7·70*	1·40	90·90 , ,,
60°	Gases evolved from green slime collected at St. Mark's Place on 4th June at 9·30 a.m. and placed in inverted bottle. In three hours the gas which had been evolved was examined and found to consist of - - - - -	13·40	1·60	85·00 ,, ,,
60°	Gases evolved from green slime or matter collected at St. Mark's Place on 4th June at 9·30 a.m. and placed in bottle containing one-third of green slime, and the remaining two-thirds of common air. The atmosphere in forty hours extinguished a lighted taper and was found to consist of - - -	11·56	2·01	86·43 not combustible and not capable of supporting combustion.

* Containing hydro-sulphuric acid in small quantities.

TABLE R.

Gases dissolved in the Water of the Water of Leith, &c.

Temperature of Matter.	Place and Time of Collection.	Cubic inches of gas per gallon of water.	Per-centage composition of the gases by volume.		
			Carbonic acid.	Oxygen.	Other gases.
44°	Spring water, as supplied to Edinburgh, taken from main leading into the cistern at Surgeons' Hall, on the 16th April 1864 at 10 a.m.	10·01	9·59	28·77	61·64
51°	Spring water, as supplied to Edinburgh, taken from the cistern at Surgeons' Hall after standing a night in the cistern, on 18th April 1864 at 10.5 a.m.	9·96	10·71	29·47	59·82
47°	Spring water, as supplied to Edinburgh, on 27th May 1864 at 3 p.m.	9·33	8·70	29·40	61·90
45°	Water from Harelaw Reservoir, taken on 15th April 1864 at 11 a.m.	9·24	1·92	29·23	68·85
46°	Water from Water of Leith, taken from above Balerno Bridge on 15th April 1864 at 12 noon	9·69	1·89	28·87	69·24
47°	Water from Water of Leith, taken from above Currie on 15th April 1864 at 12.35 p.m.	9·30	5·88	22·06	72·06
52°	Water from Water of Leith, taken from Gorgie Dam on 27th May 1864 at 12.45 p.m.	9·21	6·10	25·20	68·70
46°	Water from Water of Leith, taken above Coltbridge on 14th May 1864	9·60	7·41	22·22	70·37
53°	Water from Water of Leith taken from above Coltbridge on 27th May 1864 at 1 p.m.	9·29	6·60	22·20	71·20
45°	Water from Lochrin Burn, west of slaughter-houses, collected on 14th April 1864	13·71	52·67	3·33	44·00
59°	Water from Lochrin Burn, above Caledonian Distillery, collected on 27th May 1864 at 12.25 p.m.	9·77	50·00	2·70	47·30
59°	Water from Lochrin Burn above Coltbridge, collected on 27th May 1864 at 1.15 p.m.	12·67	54·70	2·10	43·20
52°	Water from Moray Place Sewer, collected on 27th May 1864 at 2.3 p.m.	10·74	42·30	2·80	54·90
50°	Water from sewer at Canonmills, collected on 27th May 1864 at 2.18 p.m.	13·87	59·60	2·60	37·80
53°	Water of Leith from dam below Water of Leith Village, collected on 27th May 1864 at 1.35 p.m.	6·31	6·30	4·20	89·50
53°	Water of Leith below Dean Bridge, collected on 27th May 1864 at 1.40 p.m.	7·22	14·30	5·70	80·00
47°	Water from Water of Leith, behind Moray Place, near St. Bernard's Well, collected on 14th April 1864	6·90	14·29	10·20	75·51
53°	Water from Water of Leith, behind Moray Place, near St. Bernard's Well, on 27th May 1864 at 1.50 p.m.	7·29	22·00	6·10	71·90
52°	Water from Water of Leith, above Stockbridge, collected on 27th May 1864 at 2.6 p.m.	6·95	19·70	6·60	73·70
52°	Water from Water of Leith, 30 yards below Stockbridge, collected on 27th May 1864 at 2.8 p.m.	5·60	24·60	4·10	71·30
47°	Water from Water of Leith at St. Mark's Place, collected on 14th April 1864	7·64	18·60	6·98	74·42
52°	Water from Water of Leith at St. Mark's Place, collected on 27th May 1864 at 2.30 p.m.	8·87	25·80	4·10	70·10
47°	Water from lade behind India Place, collected on 14th April 1864	6·47	9·52	4·76	85·72
53°	Water from lade behind India Place, collected on 27th May 1864 at 1.55 p.m.	7·13	12·80	6·40	80·80
53°	Water from lade before joining Water of Leith at St. Mark's Place, collected on 27th May 1864 at 2.35 p.m.	7·64	14·20	5·40	80·40

Table S.

Examination of the Atmosphere in the neighbourhood of the Water of Leith, &c. determined by standard solution of permanganate of potash.

Degree of absolute purity of air, 100°.

Place and Time of Collection.	Temperature of air.	Degree of purity.
Air collected at west side of St. Andrew's Square, Edinburgh, on 7th April 1864 at 6.35 p.m.	57°	85°
Air collected at the Scott Monument, Princes Street, Edinburgh, on 7th April 1864 at 6.25 p.m.	57°	70°
Air collected on the Calton Hill in Edinburgh on 7th April 1864 at 5.40 p.m.	57°	67°
Air collected over the Lochrin Burn Sewer west of slaughter-houses on 7th April 1864 at 1 p.m.	56°	55°
Air collected in the vicinity of the Canonmills Sewer in the Water of Leith on 7th April 1864 at 5 p.m.	55°	58°
Air collected over the Water of Leith above Coltbridge, and before mingling with sewage, on 7th April 1864 at 1.40 p.m.	56°	75°
Air collected over the Water of Leith below the dam under Water of Leith Village on 7th April 1864 at 2.10 p.m.	58°	(1) 100° destroyed. (2) 100° destroyed. (3) 100°, and only 20° left.
Air collected over the lade behind Moray Place on 7th April 1864 at 2.55 p.m.	56°	55°
Air collected over the Water of Leith at St. Mark's Place on 7th April 1864 at 5.15 p.m.	54°	63°
Air collected at west side of St. Andrew's Square, Edinburgh, on 9th April 1864 at 10.24 a.m.	59°	80°
Air collected on the Calton Hill, Edinburgh (S. of Observatory) on 9th April 1864 at 10.34 a.m.	63°	75°
Air collected in Windsor Street, Edinburgh, on 9th April 1864 at 10.43 a.m.	64°	80°
Air collected at the south-west corners of Constitution and Charlotte Streets, Leith, on 9th April 1864 at 1.20 p.m.	64°	80°
Air collected in harbour of Leith at Victoria Dock Head on 9th April 1864 at 2.50 p.m.	59°	70°
Air collected in harbour of Leith off Ferry Boat Stairs on 9th April 1864 at 3 p.m.	61°	60°
Air collected at foot of Fishmarket Stairs, harbour of Leith, on 9th April 1864 at 11.10 a.m.	59°	60°
Air collected off side of vessel near Coalhill Sewer, Leith, on 9th April 1864 at 11.25 a.m.	63°	50°
Air collected over the Water of Leith, midway between Coalhill and Bulls Stank Sewers on 9th April 1864 at 2.40 p.m.	64°	60°
Air collected at east side of Junction Road Bridge over Water of Leith on 9th April 1864 at 11.33 a.m.	66°	60°
Air collected in the vicinity of the Broughton Burn, near Leith, on 9th April 1864 at 12.15 p.m.	65°	55°
Air collected over the Water of Leith at St. Mark's Place, Edinburgh, on 9th April 1864 at 3.35 p.m.	62°	55
Air collected in the vicinity of the North Sewer at Stockbridge, Edinburgh, on 9th April 1864 at 4 p.m.	56°	55°
Air collected over the lade behind India Place, Edinburgh, on 9th April 1864 at 4.10 p.m.	61°	60°
Air collected under dam below Water of Leith Village, Edinburgh, on 9th April 1864 at 4.30 p.m.	68°	50°
Air collected under dam above Water of Leith Village, Edinburgh, on 9th April 1864 at 4.40 p.m.	61°	55°
Air collected over the Lochrin Burn, west of slaughter-houses, on 14th April 1864 at 11.20 a.m.	60°	68°
Air collected over Water of Leith above Coltbridge, and before mingling with sewage, on 14th April 1864 at 12.20 p.m.	60°	80°
Air collected over Water of Leith behind Moray Place, Edinburgh, on 14th April 1864 at 1 p.m.	63°	66°
Air collected over Water of Leith behind India Place, Edinburgh, on 14th April 1864 at 1.40 p.m.	63°	70°
Air collected in the vicinity of the North Sewer at Stockbridge, Edinburgh, on 14th April 1864 at 1.50 p.m.	62°	64°
Air collected over the Water of Leith at St. Mark's Place, Edinburgh, on 14th April 1864 at 2.30 p.m.	64°	70°

Table T.

Organic growths found in the open sewers and in the Water of Leith conveying sewage.

Dried at 212° Fahrenheit.

Place and Time of Collection.	Per-centage composition.			
	Organic matter.	Earthy matter.	Total.	Nitrogen.
Edinburgh sewers, organic growth collected from Lochrin Burn, west of slaughter-houses, on 23d March 1864 at 1.5 p.m. -	64·32	35·68	100·00	0·96
Edinburgh sewers, organic growth collected from Lochrin Burn, west of slaughter-houses, on 20th May 1864 at 12.40 p.m. -	40·52	59·48	100·00	0·68
Water of Leith lade, organic growth collected from twigs of trees hanging into the lade behind Moray Place on 23d March 1864 at 3 p.m. - - - - - -	34·60	65·40	100·00	0·52
Water of Leith lade, organic growth collected from the stones of the sides of the lade behind Moray Place on 23d March 1864 at 3.10 p.m. - - - - -	38·84	61·16	100·00	0·56
Water of Leith lade, organic growth collected from the stones of the sides of the lade behind Moray and Ainslie Place on 28th May 1864 at 2.15 p.m. - - -	57·87	42·13	100·00	1·42
Bed of Water of Leith, organic growth collected off stones in bed of river behind Moray and Ainslie Places on 11th April 1864 at 11.30 a.m. - - - - - -	66·00	34·00	100·00	0·79
Bed of Water of Leith, organic growth collected off sides of run of Water of Leith, 30 yards below Stockbridge, on 20th May 1864 at 2.40 p.m. - - - - - -	52·12	47·88	100·00	0·92
Average of 7 samples -	50·61	49·39	100·00	0·84

Table U.

Average Analyses.

Liquids collected from the Drains and Sewers discharging into the Water of Leith. One Imperial Gallon contains

Place of Collection.	In solution.			In suspension.			In solution and suspension.		
	Organic matter in grains.	Saline matter in grains.	Total matter in solution in grains.	Organic matter in grains.	Earthy matter in grains.	Total matter in suspension in grains.	Organic matter in grains.	Saline and earthy matter in grains.	Grand total matter in grains.
Average of 18 samples from Lochrin Burn sewer, west of abbatoir or slaughter-houses - - - - -	12·36	26·61	38·97	33·06	24·66	57·72	45·42	51·27	96·69
Average of 15 samples from Lochrin Burn sewer, above Caledonian Distillery -	15·77	26·70	42·47	28·61	7·79	36·40	44·38	34·49	78·87
Average of 20 samples from Lochrin Burn sewer, above Coltbridge and just before entering the Water of Leith, west of Edinburgh - - - - -	31·31	26·53	57·84	29·23	9·17	38·40	60·54	35·70	96·24
Average of 10 samples from North sewer at Stockbridge, Edinburgh - -	8·29	24·04	32·33	13·27	8·81	22·08	21·56	32·85	54·41
Average of 12 samples from South (Moray Place) sewer at Stockbridge - -	7·07	22·45	29·52	24·72	12·45	37·17	31·79	34·90	66·69
Average of 21 samples from Canonmills sewer - - - - - -	8·20	24·10	32·30	15·50	11·00	26·50	23·70	35·10	58·80
Average of 2 samples from Broughton Burn sewer at Bonnington Road -	10·56	25·52	36·08	37·44	17·20	54·64	48·00	42·72	90·72
Average of 5 samples from Bulls Stank sewer - - - - - -	5·92	31·42	37·34	10·88	5·28	16·16	16·80	36·70	53·50
Average of 3 samples from Coal Hill sewer at Leith - - - - - -	64·64	145·76	210·40	80·48	36·32	116·80	145·12	182·08	327·20
Average of 1 sample from sewer below lower drawbridge at Leith - -	7·84	46·56	54·40	10·40	4·80	15·20	18·24	51·36	69·60

Table V.

Average Analyses.

Liquids collected from the Water of Leith, from immediately above Coltbridge down to the Harbour of Leith. One Imperial Gallon contains

Place of Collection.	In solution.			In suspension.			In solution and suspension.		
	Organic matter in grains.	Saline matter in grains.	Total matter in solution in grains.	Organic matter in grains.	Earthy matter in grains.	Total matter in suspension in grains.	Organic matter in grains.	Saline and earthy matter in grains.	Grand total matter in grains.
Average of 23 samples from the Water of Leith immediately above Coltbridge	3·34	12·96	16·30	1·73	2·32	4·05	5·07	15·28	20·35
Average of 1 sample from the Water of Leith at dam below Coltbridge - -	6·40	16·80	23·20	2·96	1·32	4·28	9·36	18·12	27·48
Average of 2 samples from the Water of Leith at dam above Water of Leith Village - - - - - -	4·60	11·84	16·44	5·59	3·04	8·63	10·19	14·88	25·07
Average of 8 samples from the Water of Leith at dam below Water of Leith Village - - - - - -	5·36	14·93	20·29	4·27	1·38	5·65	9·63	16·31	25·94
Average of 6 samples from the Water of Leith under Dean Bridge - -	7·39	15·73	23·12	2·76	0·69	3·45	10·15	16·42	26·57
Average of 6 samples from the Water of Leith behind Moray Place, near St. Bernard's Well - - - - -	6·86	15·08	21·94	2·75	0·70	8·45	9·61	15·78	25·39
Average of 6 samples from the Water of Leith above Stockbridge - -	7·36	16·16	23·52	2·55	0·58	3·13	9·91	16·74	26·65
Average of 9 samples from the Water of Leith, 30 yards below Stockbridge -	8·92	15·40	24·32	14·24	2·50	16·74	23·16	17·90	41·06
Average of 1 sample from the Water of Leith behind Warriston Crescent -	7·04	25·60	32·64	10·68	3·52	14·20	17·72	29·12	46·84
Average of 6 samples from the Water of Leith lade behind India Place - -	6·05	17·14	23·19	2·84	1·06	3·90	8·89	18·20	27·09
Average of 2 samples from the Water of Leith lade below Beaver Hall - -	10·20	17·28	27·48	6·02	1·36	7·38	16·22	18·54	34·86
Average of 18 samples from the Water of Leith at St. Mark's Place below junction of lade - - - - -	7·98	14·68	22·66	18·47	15·27	33·73	26·45	29·95	56·39
Average of 1 sample from the Water of Leith from dam above Bonnington -	12·80	17·80	30·60	115·68	153·12	268·80	128·48	170·92	299·40
Average of 1 sample from the Water of Leith at boundary of Edinburgh and Leith at Bonnington Bridge - -	10·24	17·60	27·84	30·88	33·12	64·00	41·12	50·72	91·84
Average of 1 sample from the Water of Leith from dam above Junction Road Bridge - - - - - -	16·96	21·92	38·88	500·96	369·12	870·08	517·92	391·04	908·96
Average of 1 sample from the Water of Leith above the Saw Mills at Leith -	4·32	10·08	14·40	5·20	3·52	8·72	9·52	13·60	23·12
Average of 2 samples from the Water of Leith below Junction Road Bridge -	9·18	18·32	27·50	3·72	3·28	7·00	12·90	21·60	34·50
Average of 3 samples from the Water of Leith above Coal Hill at Leith - -	9·01	65·60	74·61	14·29	5·92	20·21	23·30	71·52	94·82
Average of 1 sample from the Water of Leith from off Coal Hill Sewer at Leith	35·20	170·08	205·28	8·32	6·72	15·04	43·52	176·80	220·32
Average of 1 sample from the Water of Leith from harbour at Upper Drawbridge - - - - - -	27·36	157·76	185·12	4·16	3·84	8·00	31·52	161·60	193·12
Average of 1 sample from the Water of Leith from harbour below Upper Drawbridge - - - - - -	31·84	609·60	641·44	10·72	10·40	21·12	42·56	620·00	662·56
Average of 1 sample from the Water of Leith from harbour off Victoria Dockhead - - - - - -	3·92	1208·80	1212·72	1·32	1·12	2·44	5·24	1209·92	1215·1

Table W.

Average Analyses.

Sedimentary Matters collected from the open Sewers discharging into the Water of Leith, from the bed of the Water of Leith, and from the bottom of the Edinburgh lade.

Dried at 212° Fahr.

Place of Collection.	Per-centage composition.			
	Organic matter.	Earthy matter.	Total.	Nitrogen.
Average of 7 samples collected from Edinburgh sewers, Lochrin Burn sewer, west of abbatoir or slaughter-houses - - - - - -	49·70	50·30	100·00	1·27
Average of 3 samples collected from Edinburgh sewers, Lochrin Burn sewer, above Caledonian Distillery - - - - - - -	27·70	72·30	100·00	0·52
Average of 3 samples collected from Edinburgh sewers, Lochrin Burn sewer, immediately above Coltbridge - - - - - - -	17·02	82·98	100·00	0·71
Average of 1 sample collected from Edinburgh sewers, Bulls Stank sewer, at Lovers Loan - -	50·72	49·28	100·00	0·76
Average of 1 sample collected from Edinburgh sewers, Broughton Burn sewer, at Bonnington Road - - - - - - -	20·52	79·48	100·00	0·82
Average of 4 samples collected from bed of Water of Leith, between Water of Leith Village and the Dean Bridge - - - - - -	48·12	51·88	100·00	1·63
Average of 2 samples collected from bed of Water of Leith, behind Ainslie and Moray Places - -	44·92	55·08	100·00	0·98
Average of 8 samples collected from bed of Water of Leith, below North and South sewers at Stockbridge - - - - - - -	43·67	56·33	100·00	1·14
Average of 1 sample collected from bed of Water of Leith, from sides of narrowed channel at Stockbridge - - - - - - - -	34·52	65·48	100·00	0·50
Average of 1 sample collected from bed of Water of Leith, 80 yards below Stockbridge - - -	25·12	74·88	100·00	1·03
Average of 1 sample collected from bed of Water of Leith, behind Malta Terrace - - -	32·52	67·48	100·00	1·08
Average of 1 sample collected from bed of Water of Leith, in front of sewer at Canonmills - -	31·72	68·28	100·00	0·57
Average of 9 samples collected from bed of Water of Leith, behind Warriston Crescent and at St. Mark's Place - - - - - - - -	36·05	63·95	100·00	1·05
Average of 1 sample collected from bed of Water of Leith at dam above Bonnington - - -	49·72	50·28	100·00	1·40
Average of 1 sample collected from bed of Water of Leith at boundary of Edinburgh and Leith at Bonnington Bridge - - - - - -	26·92	73·08	100·00	0·70
Average of 1 sample collected from bed of Water of Leith, immediately below the junction of the Broughton Burn - - - - - -	13·72	86·28	100·00	0·52
Average of 1 sample collected from bed of Water of Leith, at dam above Junction Road Bridge - -	27·72	72·28	100·00	0·70
Average of 7 samples collected from bed of Water of Leith lade which traverses Edinburgh - -	25·70	74·30	100·00	0·69
Average of 12 samples collected from the bottom of the harbour of Leith, south-east side - - -	28·33	71·67	100·00	0·64
Average of 6 samples collected from the bottom of the harbour of Leith, north-west side - -	20·18	79·82	100·00	0·62

Table X.

Average Analyses.

Gases evolved during the decomposition of the Sedimentary Matters lying in the open Sewers, the Lades, and in the Bed of the Water of Leith.

Place of Collection.	Per-centage composition of the gases by volume.		
	Carbonic acid.	Oxygen.	Other gases.
Average of 1 sample of gases evolved from sediment in Lochrin Burn - - - - - -	14·63	0·81	84·56, combustible with blue white flame.
Average of 4 samples of gases evolved from sediment in bed of Water of Leith from Coltbridge down to St. Bernard's Well - - - - -	9·12	1·00	89·88 „ „
Average of 2 samples of gases evolved from sediment in lade of Water of Leith which traverses Edinburgh - - - - - - -	1·58	1·48	96·94 „ „
Average of 5 samples of gases evolved from sediment in bed of Water of Leith, from Stockbridge down to Junction Road Bridge - - - -	5·43*	1·51	93·06 „ „
Average of 2 samples of gases evolved from sediment in Harbour of Leith - - - - -	16·65*	1·60	81·75 „ „

* Containing hydrosulphuric acid (sulphuretted hydrogen).

Table Y.

Average Analyses.

Gases dissolved in the Water of the Water of Leith, &c.

Place of Collection.	Cubic inches of gas per gallon of water.	Per-centage composition of the gases by volume.		
		Carbonic acid.	Oxygen.	Other gases.
Average of 3 samples of spring-water as supplied to Edinburgh - - -	9·77	9·67	29·21	61·12
Average of 2 samples of water from the sources of the Water of Leith - - -	9·47	1·91	29·05	69·04
Average of 4 samples of water from the Water of Leith as it flows down to Coltbridge - - - - - -	9·35	6·50	22·92	70·58
Average of 5 samples of water from the sewers of Edinburgh - - -	12·15	51·85	2·71	45·44
Average of 8 samples of water from the Water of Leith, from Coltbridge down to St. Mark's Place - - - -	7·10	18·20	6·00	75·80
Average of 3 samples of water from the lade of the Water of Leith which traverses Edinburgh - - - - -	7·08	12·17	5·52	82·31

Table Z.

Average Analyses.

Examination of the Atmosphere in the Neighbourhood of the Water of Leith, &c.

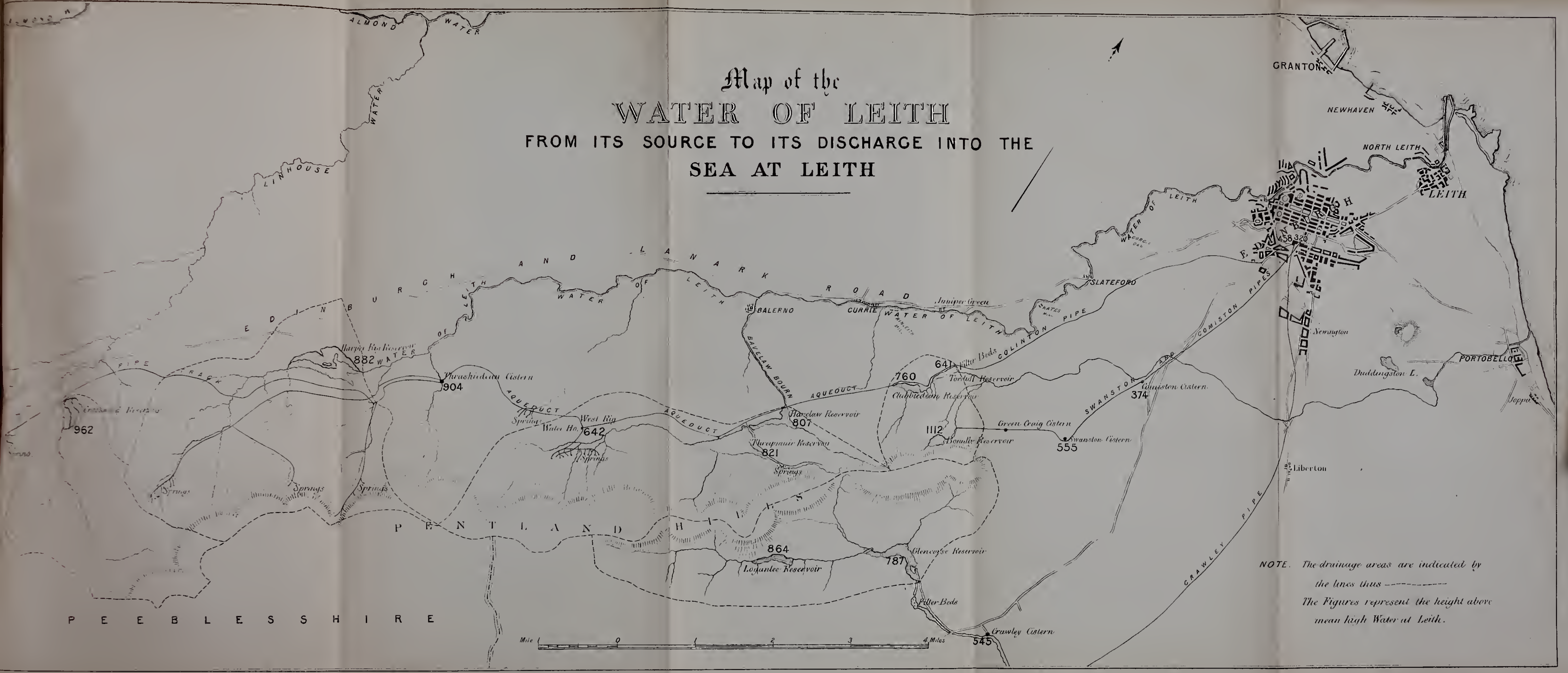
Degree of absolute Purity of Air, 100°·00.

Place of Collection.	Degree of Purity.
Average of 7 samples of air collected from five stations in Edinburgh and Leith away from the influence of open sewers and of the Water of Leith - -	76°·71
Average of 2 samples of air collected over the Water of Leith above Coltbridge and before mingling with sewage - - - - - - -	77°·50
Average of 3 samples of air collected from above the open sewers of Edinburgh and Leith - - -	59°·33
Average of 16 samples of air collected over the Water of Leith from Coltbridge down to the Harbour of Leith, and after being mingled with sewage* -	60°·37
Average of 2 samples of air collected over the lade of the Water of Leith which traverses Edinburgh and conveys sewage - - - - -	57°·50

* One sample of air collected over the Water of Leith, below the dam under Water of Leith Village, has not been included in the above average, as its degree of impurity is unusually high (Table S.) owing to the more rapid escape of the impure gases from the water as it falls over the dam and is dashed into foam.

INDEX.


Plan of
EDINBURGH
LEITH AND SUBURBS
ILLUSTRATIVE OF THE MAIN DRAINAGE SCHEME
FOR THE PURIFICATION OF THE
WATER OF LEITH.
FIRTH OF FORTH
Granton Pier
Newhaven Pier
West Pier
East Pier
Black Rocks
Victoria Wet Dock
NORTH LEITH
SOUTH LEITH
MAIN DRAIN
SCALE
2640 Feet Half a Mile
e areas draining into the Water of Leith are edged with Green.
e Main Sewer and its branches are shewn by a Thick Red Line
e Ordinary Street Drains and Sewers to be intercepted, are shewn
a Thin Red Line
e Water of Leith, and the principal Lade and the open Burns
nveying Sewage, are coloured Blue.
B. _ Between Coltbridge and St Marks Place the Main Drain lies in
the Water of Leith, near the South East Bank.
EDINBURGH AND GRANTON RAILWAY
EDINBURGH AND LEITH RAILWAY
LEITH AND PORTOBELLO RAILWAY
WATER OF LEITH
BROUGHTON BURN SEWER
Boundary of Edinburgh and Leith
St. Marks Place
Warriston Crescent
LADE
Stockbridge
Moray Place
WATER OF LEITH VILLAGE
CALTON HILL
Lochend Loch
CRAIGENTINNY BURN
NORTH BRITISH RAILWAY
EDINBURGH
Princes Street
CASTLE
St. Margarets Loch
Quarry
Dunsapie Loch
Duddingston Loch
CALEDONIAN RAILWAY
UNION CANAL
CALEDONIAN DISTILLERY
LOCHRIN BURN SEWER
Water Shed between Craigentinny Burn on the North and the Pow Burn on the South
POW BURN
BRAID BURN
JORDAN BURN
Day & Son (Limited) Lith.



Map of the
WATER OF LEITH
FROM ITS SOURCE TO ITS DISCHARGE INTO THE
SEA AT LEITH
ALMOND WATER
WATER
LINHOUSE
EDINBURGH AND LANARK ROAD
WATER OF LEITH
BALERNO
CURRIE
Juniper Green
SLATEFORD
GRANTON
NEWHAVEN
NORTH LEITH
LEITH
PORTOBELLO
Duddingston L.
Joppa
Newington
Liberton
BAVELAW BOURN
AQUEDUCT
COLINTON PIPE
COMISTON PIPES
SWANSTON AND COMISTON
CRAWLEY PIPE
PIPE TRACK
Harper Rig Reservoir
882
Thrashiedean Cistern
904
962
West Rig
Water Ho.
642
Springs
Harelaw Reservoir
807
Threipmuir Reservoir
821
760
641
Filter Beds
Torduff Reservoir
Clubbiedean Reservoir
1112
Bonaly Reservoir
Green Craig Cistern
Swanston Cistern
555
374
458
320
PENTLAND HILLS
864
Loganlee Reservoir
787
Glencorse Reservoir
Filter Beds
Crawley Cistern
545
PEEBLESSHIRE
Mile 0 1 2 3 4 Miles
NOTE. The drainage areas are indicated by the lines thus ----------
The Figures represent the height above mean high Water at Leith.

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